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ABSTRACT

This hearing focuses on the federal role in K-12 mathematics reform. Prepared statements are provided from: Michael N. Castle, Chairman, Subcommittee on Early Childhood Youth, and Families; Dale E. Kildee, Ranking Member, Subcommittee on Early Childhood Youth, and Families; Howard P. "Buck" Mckeon, Chairman, Subcommittee on Postsecondary Education, Training and Life-Long Learning; Matthew G. Martinez, Ranking Member, Subcommittee on Postsecondary Education, Training and Life-Long Learning; Judith S. Sunley, Interim Director, Office of Education and Human Resources, National Science Foundation; Kent McGuire, Assistant Secretary, Office of Education Research and Improvement, U.S. Department of Education; James Milgram, Professor of Mathematics, Stanford University; Mark Schwartz, Parent; Susan Sarhady, Parent; James Rutherford, Education Advisor to the Executive Officer, American Association for the Advancement of Science. Additional materials submitted for the record, such as a report on a survey of graduating students from a particular class concerning how their high school mathematics program prepared them for college, are also included. (MM)

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THE FEDERAL ROLE IN K-12 MATHEMATICS REFORM

HEARING

BEFORE THE

SUBCOMMITTEE ON EARLY CHILDHOOD, YOUTH AND FAMILIES

OF THE

COMMITTEE ON EDUCATION AND THE WORKFORCE

JOINT

WITH THE

SUBCOMMITTEE ON POSTSECONDARY EDUCATION, TRAINING AND LIFE-LONG LEARNING

OF THE

COMMITTEE ON EDUCATION AND THE WORKFORCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTH CONGRESS

SECOND SESSION

HEARING HELD IN WASHINGTON, DC, FEBRUARY 2, 2000

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JOINT HEARING ON:
THE FEDERAL ROLE IN K-12 MATHEMATICS REFORM

Wednesday, February 2, 2000

U.S. HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON EARLY CHILDHOOD, YOUTH, AND FAMILIES AND SUBCOMMITTEE ON POSTSECONDARY EDUCATION, TRAINING AND LIFELONG LEARNING,
COMMITTEE ON EDUCATION AND THE WORKFORCE,
WASHINGTON, D.C.

The subcommittee met, pursuant to call, at 10:30 a.m., in Room 2175, Rayburn House Office Building, Hon. Michael N. Castle [chairman of the Subcommittee on Early Childhood, Youth and Families] presiding.

Present: Representatives Castle, Goodling, Petri, McKeon, Johnson, McIntosh, Schaffer, Hilleary, Ehlers, DeMint, Isakson, Kildee, Martinez, Roemer, Scott, Woolsey, Romero-Barcelo, McCarthy, Tierney, Kind, Ford, Kucinich, and Holt.

Staff Present: Becky Campoverde, Communications Director; Victor Klatt, Education Policy Coordinator; Dan Lara, Press Secretary; Sally Lovejoy, Senior Education Policy Advisor; Patrick Lyden, Professional Staff Member; Maria Miller, Staff Assistant; D'Arcy Philps, Professional Staff Member; Michael Reynard, Media Assistant; Jo-Mane St. Martin, General Counsel; Bob Sweet, Professional Staff Member; Kevin Talley, Staff Director; Cedric R. Hendricks, Minority Deputy Counsel; June Harris, Minority Education Coordinator; Alex Nock, Minority Legislative Associate; Mary Ellen Ardouny, Minority Legislative Associate; and Roxana Folescu, Minority Staff Assistant.

The Opening Statement Of Representative Michael N. Castle, Chairman, Subcommittee On Early Childhood, Youth, And Families.

Mr. Castle. Ladies and gentlemen, if we could come to order.

A quorum being present, the Subcommittee on Early Childhood, Youth and Families, and the Subcommittee on Postsecondary Education, Training and Lifelong Learning, headed by Chairman McKeon, will come to order.

We are holding this joint subcommittee hearing today to hear testimony on the federal and kindergarten through 12th grade mathematics reform.

Under Committee Rule 12(b), opening statements are limited to the Chairman and the ranking minority member of each subcommittee. This will allow us to hear from our witnesses sooner, and to help members keep to their schedules. Therefore, if other members have statements, they may be included in the hearing record.

With that, I ask unanimous consent for the hearing record to remain open for 14 days to allow members' statements, witnesses' written testimony, and other material to be submitted for the record. Without objection, so ordered.

My name is Mike Castle, and I am the Chairman of the Early Childhood, Youth and Families Subcommittee. Mr. Kildee, who is right to my right, is the ranking member of that committee. I would like to welcome you to this joint hearing with Chairman Buck McKeon and his Subcommittee on Postsecondary Education, Training and Lifelong Learning, on the federal role in math for grades K through 12.

Today, I am pleased to announce that we are joined by our colleagues from the Science Subcommittee on Basic Research, and I would like to recognize . . . I don't know if they are here yet, but they should be here at some point . . . Vern Ehlers and Lynn Woolsey, who have the privilege to serve on both the Education and Science Committees.

With the dawning of the 21st century, it is clear to me that proficiency in math and science will be critical if today's students are expected to fill the employment opportunities offered by tomorrow's high tech world.

Still, we watch with concern as our students' math scores remain low in relation to other industrialized nations. In fact, according to the 1998 Third International Mathematics and Science Study, American high school seniors scored worse than their counterparts in all but four countries, and were next to the last in physics and advanced math.

Our hearing today will focus on the 10 math programs supported in part by the National Science Foundation and endorsed by the United States Department of Education as exemplary or promising. Subsequent to the endorsement of these programs, it came to my attention that a letter signed by more than 200 math and science scholars was sent to Education Secretary Riley asking him to rescind the Department's endorsements.

In their letter, the scholars presented evidence that the endorsed programs adhered to a common philosophy of math that minimized essential computational skills and were not based on sound scientific research. In addition, they promoted a lower level of proficiency in mathematics than the newly adopted California state standards.

Decisions about school curriculum have been, and continue to be, a local decision. While I believe there is a limited role for the Federal Government to influence the choice of a quality math curriculum, I also believe that the Federal Government must take care not to have that influence override the state, local, or parental choice in curriculum or use that influence to pressure state and local schools to implement national math standards.

In addition, federal math research must be based on sound scientific research, and these studies must be completed before program recommendations are disseminated

nationwide. As the United States Department of Education has stated, ``the single greatest predictor of success in college . . . not just for engineering or science majors but for all majors . . . is success in secondary school algebra."

We all want to raise the math skills of our students, and I hope that this hearing can shed some light on the best way to achieve that goal.

I wish to thank each of you for taking time to be with us. In just a few moments, I will proceed with introductions of all of you as witnesses. But at this time I will yield to the ranking member of this subcommittee, Mr. Kildee, for any statement that he might have, and note that Chairman McKeon and Mr. Martinez might also wish to make brief statements.

See Appendix A For The Written Statement Of Representative Michael N. Castle, Chairman, Subcommittee On Early Childhood, Youth, And Families.

The Opening Statement Of Representative Dale E. Kildee, Ranking Member, Subcommittee On Early Childhood, Youth, And Families.

Mr. Kildee. Thank you, Mr. Chairman. I am pleased to join my Postsecondary Education Subcommittee colleague, Mr. Martinez, Chairman Castle, and Chairman McKeon at today's hearing on the federal role math reform and.

We all can agree that our nation's children deserve a top-notch education, and essential in this effort is math instruction that will enable our children to be successful later in life in employment whether they serve as mathematics teachers, doctors, nurses, cooks, or even members of this Congress. Our math has improved a bit lately, as have finally balanced the budget.

Critical to ensuring that our children receive a quality education is a research-tested curriculum, coupled with high-quality instruction and an environment conducive to learning. All of these variables affect student achievement. And while curriculum choices are a critical component, substandard learning environments and unqualified teachers will produce poor student achievement, no matter what curriculum is utilized.

What I believe is needed by many school districts across this nation is guidance on what research shows to increase student achievement. The recommendation of the Department of Education's mathematics and science panel should be one of many tools that school districts utilize in selecting and improving their curriculum.

For school districts and states whose standards are aligned with those issued by the National Council of Teachers of Mathematics, the programs designed by the Department may be worth examining. For those whose standards are not aligned with the NCTM standards, the diligent process that we will hear about from Assistant Secretary McGuire and Dr. Rutherford may be useful in shaping curriculum decisions.

Overall, I believe it is critical that school districts have access to research on proven programs. We are at a critical time in American math education. Our nation has not had a good track record on math achievement, as the TIMSS report and other assessments such as the SAT and ACT have demonstrated.

What is even more troubling is that the math assessment results of women and minorities lag behind their peers. This translates into fewer women and minorities in careers that require math and science backgrounds. If existing methods have failed to turn this around, we must find a way to reverse this trend by ensuring that school districts have as much information as possible to make their decision.

I thank you, Mr. Chairman, for having this hearing today.

See Appendix B For The Written Statement Of Representative Dale E. Kildee, Ranking Member, Subcommittee On Early Childhood, Youth, And Families.

The Opening Statement Of Representative Howard P. "Buck" Mckeon, Chairman, Subcommittee On Postsecondary Education, Training And Life-Long Learning.

Mr. Castle. Well, thank you, Mr. Kildee, for your opening statement.

And I now recognize Mr. McKeon, the Chairman of the Subcommittee on Postsecondary Education, Training and Lifelong Learning, for his opening statement. We have very long titles for all of our subcommittees on this committee.

Mr. McKeon. Thank you, Mr. Chairman.

Good morning. I, too, want to welcome all those in attendance this morning as we focus on the critical issue of math education in this country.

As a member from California who has spent considerable time on issues surrounding higher education, teacher quality, and job training programs, I am well aware of the shortcomings of far too many of our students in the area of math education, and the challenges we face on reversing this trend. These challenges simply cannot be ignored, especially in states such as mine that are critically dependent upon a technology-savvy workforce with a firm grasp of mathematics.

Professor Milgram, who is here with us today, points out in his prepared testimony that over half of all students attending the California state university system, which admits only the top third of the high school graduates from the state, have been required to take remedial math. This is up from 23 percent in 1989.

Clearly, if there is common ground around this issue, it is the recognition that at the very precise time mathematics is a critical skill, we seem to be doing a worse, not a better, job in preparing students in this area. The efforts of the National Science

Foundation, the Department of Education, and others have been to expand math to more students, in part by making it more appetizing.

Has this been successful? Have there been drawbacks? Is there valid evidence that these approaches have been working? Are these approaches appropriate for wide dissemination and implementation? I look eagerly forward to having these and many other questions addressed at this hearing.

I would like to point out that the purpose of this hearing is not to reject reform in mathematics education. Clearly, even in schools that have not instituted math reform, far too many students are falling through the cracks. Instead, we are here to look at what impact reform efforts have had on student achievement, and what role the Federal Government should play.

In this context, we must also remember that reform is not just a matter of a silver bullet curriculum. We must continue to explore the positive impact that parental involvement, high expectations, and highly qualified teachers have on ensuring that more students perform at higher levels of mathematics.

Again, I thank the witnesses for taking time to discuss this important issue with us today. I look forward to your testimony.

I yield back to Chairman Castle.

See Appendix C For The Written Statement Of Representative Howard P. "Buck" Mckeon, Chairman, Subcommittee On Postsecondary Education, Training And Life-Long Learning.

Mr. Castle. Thank you, Mr. McKeon.

I now recognize the ranking minority member of the Postsecondary Education Committee, Mr. Martinez, for his opening statement.

The Opening Statement Of Representative Matthew G. Martinez, Ranking Member, Subcommittee On Postsecondary Education, Training And Life-Long Learning.

Mr. Martinez. Thank you, Mr. Chairman. Due to time constraints, I am going to submit my statement for the record, and I will make a few remarks.

First of all, I thank all of you for coming here today and giving us some of your time. We know you have busy schedules, and some of you have traveled a long way.

I want to just give you my own personal perspective of this. It is not a mystery that there is no magical solution to getting children interested in math. It takes a capable, dedicated teacher to do that.

Let me give you an example of my own personal experience. Up until I was in the 6th grade, I couldn't do math to save my life. One day my teacher asked, ``what is your problem?" I said, ``I don't understand it."

And she took the time to explain to me fractions, decimals, everything. She broke it down in a way that I could understand it. She made me interested in math, and I never had a problem with math after that.

Let me move on. I know all of you must have heard of the situation in Garfield High School where Mr. Escalente took about 21, 22 kids . . . I forget the exact number . . . and taught them a highly advanced math class. These kids took the Advanced Placement College test and they passed it. And everybody said, ``these poor Mexican kids from east L.A., from Garfield High School, had to be cheating."

And all but one took the test again, because that one was standing on principles. Well, they scored higher the second time, under careful scrutiny, than they did the first time.

The point here is that Mr. Escalente was a capable, dedicated teacher, and he took these kids, and he developed their interest in math. A lot of kids don't become interested in math and science because they never know how exciting it can be, and nobody ever shows them how interesting it can be.

Some kids aren't interested in math because they never realize how important math will be in the rest of their lives, in everything they do. I think its necessary to point out the importance of math at an early age, and capture their interest. A qualified teacher and class size reduction will help because the teacher can work more closely with the students, as my teacher worked with me on an individual basis. Mr. Escalente only worked with 21, 22 students.

I am interested in hearing your testimony but I hope some of you touch on the fact that "you can lead a horse to water, but you can't make him drink." It is the same with students. You can lead them to math, but you can't make them study, unless you get them interested in it and you make them realize how important it is to them in the rest of their lives.

I thank you, Mr. Chairman. I yield back the balance of my time.

See Appendix D For The Written Statement Of Representative Matthew G. Martinez, Ranking Member, Subcommittee On Postsecondary Education, Training And Life-Long Learning.

Mr. Castle. Thank you, Mr. Martinez, and we appreciate the openings of everybody. As we indicated earlier, for anyone who came in late, any other members who wish to submit an opening statement are entitled to do so.

Before the witnesses begin their testimony, let me just lay the groundwork for you. Some of you may be familiar with what happens here, but some may not. Essentially, I am going to take a few minutes to introduce all of you. I am going to do it

much faster than your resumes deserve, simply because we need to conserve a little bit of time, so excuse me for that.

Each of you will have five minutes in which to speak. Now, that is usually where we really run into trouble because people sometimes want to read their statements. All of the members have the statements, and I have read them. One of your statements at least was at least 20 minutes, I figured, if it was read completely.

So you have four minutes in which to speak, one minute in which to close. That is, four minutes is signified, if this new system we have works, by a green light. The one-minute should be signified by a yellow light. And the last light will be a red light, and that means you need to conclude as rapidly as you can.

And we have to enforce that, to some degree, because after you are finished speaking all of us have five minutes in which to ask questions. If a member is asking a question when the five minutes is up, we will ask them to come to a conclusion quickly on the question and get it answered quickly, and then go on to the next.

But you want to give everybody an opportunity. And if we are going to do this within the timeframe provided for the hearing. We all have other schedules, so we need to move fairly rapidly. Hopefully we won't have any votes during this time. If the bells start ringing, I will tell you what is going to happen then, but I don't think we are going to have votes because of the day.

So with that, let me rush through the introductions, as I said, faster than I really should. The first witness will be Dr. Judith Sunley. Dr. Sunley is the Acting Education Division Director of the National Science Foundation in Arlington, Virginia. The National Science Foundation is an independent government agency whose mission it is to promote the progress of science and advance the national health prosperity and welfare of our citizens. NSF funds many systemic math initiatives, several of which were endorsed by the United States Department of Education.

Dr. Kent McGuire is the second witness. Dr. McGuire is the Director of the Office of Education Research and Improvement for the Department of Education here in Washington, D.C. As an Assistant Secretary, he is responsible for funding research and demonstration projects to improve education, as well as collecting and disseminating statistical information on the condition of education. He oversees the panel that recommended the 10 exemplary or promising math programs to Secretary Riley.

Next is Dr. James Milgram. Dr. Milgram has been a Professor of Mathematics at Stanford University for 30 years in Palo Alto, California. He is a Research Mathematician with a Ph.D. in mathematics. He has analyzed the effectiveness of the new ``new" math programs and their impact on student math achievement. Dr. Milgram initiated the letter to Secretary Riley that was signed by 200 scholars asking that the endorsement of 10 math programs be withdrawn.

The next witness is, actually, I have this reversed, but let me do Susan Sarhady first. She is a concerned parent and constituent of Representative Sam Johnson of Texas, a member of this committee. She is here today to testify about her experiences with these new "new" math programs. Ms. Sarhady has almost 10 years of business experience, as

well as being a homemaker and parent.

Dr. Mark Schwartz has also joined us today from Livonia. Did I say that correctly? Livonia? Michigan. He is a parent of three school-age children. He is a leader in his community's efforts to improve K through 12 math and science education. Dr. Schwartz holds a master's degree in electrical engineering, a Ph.D. in neuroscience and is the president of Mandella Sciences, Inc., a company employing numerous electrical engineers and computer scientists.

There is a space at the table. She will not testify but I believe she is right here. It is Ms. Rachel Tronstein. She is in the audience now but can answer questions and will come to the table when the testimony is done. She is joining Dr. Schwartz, and she is from Bloomfield Hills, Michigan. She was in the Core Plus Math Program endorsed by the Department of Education for four years. She was a member of the National Honor Society, class treasurer, and graduated in the top 10 percent of her class, all of which we congratulate you on, Rachel.

The final witness who will testify is Professor F. James Rutherford, who is the Education Advisor for the American Association for the Advancement of Science, a nonprofit professional society dedicated to the advancement of scientific and technological excellence. He served as a member of the Math and Science Education Expert Panel. And, again, I apologize.

Mr. Johnson, I mentioned, has a constituent here, and he would like to say something briefly about her, and then we will start with the testimony.

Mr. Johnson. Thank you, Mr. Chairman. You pretty well covered it. I just would like to welcome Ms. Sarhady to the committee this morning, and tell the committee that she is very well qualified as the president of the Plano Parental Rights Council and came all the way from Texas to make sure that you get testimony from all sides.

I think we have many experts here today with degrees, and I have been saying for some time that we need to get education back in the hands of the parents. So we have got a parent here.

I welcome you to testify before the committee. Thank you for coming.

Mr. Castle. Actually, Mr. Johnson doesn't know this, but we brought you all the way from Texas to keep an eye on him here today.

[Laughter.]

We will go through all the witnesses before any questions. So with that, we will start with Dr. Sunley.

The Statement Of Judith S. Sunley, Interim Director, Office Of Education And Human Resources, National Science Foundation, Arlington, Virginia.

Ms. Sunley. Thank you, Mr. Chairman, and members of the subcommittees. Thank you very much for the opportunity to be here this morning. I appreciate the opportunity to let you know what NSF does.

I have a lengthy written statement, which I would like included for the record.

Mr. Castle. That is a good point, and I am sorry to interrupt you. But without objection, all of your statements will be included in the record.

Ms. Sunley. Thank you.

As you noted, NSF is a federal agency whose mission is to promote the progress of science and engineering. Education in science and math has been part of our mandate since the beginning. Our education programs really focus on two areas . . . the workforce of scientists and engineers, and the math and science knowledge that all citizens need.

NSF approaches its education programming much as we approach everything else; namely, operating at the frontiers of knowledge and facilitating development and implementation of new ideas and approaches. We also link our K-12 programs with our core constituencies . . . the math and science community and higher education, which is where most of the math and science community work.

The three most significant aspects of NSF's K-12 education activity deal with research, instructional materials, and teachers, both in-service and pre-service. We hope to see all of these activities involve scientists, mathematicians, and educators.

Publication in 1989 of the Standards for K-12 Math Education by the National Council of Teachers of Mathematics, or NCTM, had a significant impact on math education. These standards, arising from a community of practitioners and experts, in consultation with a wide range of stakeholders, provided new ideas and approaches that created a starting point for discussion and action.

Perhaps the key decision underlying these standards was to focus on areas that would impact the broad student population. This stemmed from recognition that K-12 math education was failing large portions of our student population at a time when knowledge of and ability to use math were becoming increasingly important for the U.S. workforce.

NSF's programming shifted to accommodate the general interest in rising expectations in math for all students, resulting from the NCTM standards. First, we stepped up to the challenge of developing new instructional materials, providing partial support for 13 multi-year math curricula. Such curricular development is extremely expensive, not likely to be undertaken by textbook publishers, absent some means of reducing their risk.

Initial awards were made in 1990, with most of the materials reaching commercial status in the 1997/'98 timeframe. At the same time, many states and local districts were interested in how to address high expectations for students in their programs. This brought NSF into a new facilitative role, one that forced us to look at how all of the pieces of K-12 math and science education fit together.

The result was a new program in 1991, a statewide systemic initiative program. Based on the experience with states, we added the urban systemic initiatives and rural systemic initiatives in 1994 and '95. Through these programs, states and districts applied to NSF for funds to implement or to plan reformed efforts. They provided NSF with their plan for the activities they would carry out, which was then reviewed by external experts as the basis for a funding decision.

The participating states and districts know from the beginning that NSF funds will not support the full effort of implementation for math and science education reform. They describe in the proposal how they will use relevant funds from local, state, and national sources in carrying out their plan. For example, use of Eisenhower professional development funds.

The awardees are also aware that there is a high-risk character to the reform activities they are undertaking. We build in accountability mechanisms, agreed upon with the awardees, to demonstrate progress in meeting their plan relative to baselines.

I have focused this testimony on the two things I understood the committee to be most interested in. NSF has many other programs that the written testimony describes in somewhat greater detail.

NSF continually evaluates and modifies its programs, in consultation with the communities with which we work. Math education is, and should be, a dynamic process that takes many influences into account. We cannot afford to let it be static, nor can we afford to let our areas of disagreement mask the fact that there is much agreement among all affected parties as to the importance of math education for our youth, and as to the core knowledge base they will need.

Constructive dialogue is critical to pulling divergent ideas and opinions into productive activities that can influence student achievement for the better.

Thank you.

See Appendix E For The Written Statement Of Judith S. Sunley, Interim Director, Office Of Education And Human Resources, National Science Foundation, Arlington, Virginia.

Mr. Castle. Thank you, Dr. Sunley.

You know, I almost can't even see these lights. These are new lights, so I don't know if you all can see them or not, but we appreciate . . .

Ms. Sunley. Sort of . . .

Mr. Castle. You did very well. I am not being critical. You did very well.

Ms. Sunley. . . . peripherally.

Mr. Castle. We will now go to Dr. McGuire, who I think is a friend of everyone up here.

The Statement Of Kent McGuire, Assistant Secretary, Office Of Education Research And Improvement, U.S. Department Of Education, Washington, DC.

Mr. McGuire. Mr. Chair and subcommittee members, thank you very much for the opportunity to testify. Your letter of invitation asked me to speak to the Department of Education's efforts to improve mathematics education broadly, and I think the written testimony tries to give you that full picture, and place the work of the expert panel in that context.

But since it is clear to me that it is the expert panel that is perhaps the most important motivating factor for the hearing, I will just take a few minutes to make just a few points about that work. And then, frankly, I really do look forward to the exchange.

Really, just two or three things I want to say at this moment. The first is this. In my view, we should respect the members of the Department's panel and applaud their good faith effort, dating back several years, to develop criteria, to review programs, and to make recommendations about math curricula that educators might want to learn more about.

These are well-respected and thoughtful people, and we should commend these folks, it seems to me, the people like them who serve on other panels that are currently operating, and all other kinds of peer review bodies that do good service for the government. I just want to make that the first thing I say, that these are good people.

The second thing I want to say is that, in my opinion, these discussions have . . . the ones that have developed since the release of the panel's recommendations in mathematics point in my view to a much more important issue for all of us.

It goes something like this . . . that while on the one hand I think we do have an obligation to offer as much guidance as we possibly can to the field about what is currently available, we should, at the same time, know that at any point in time we don't have perfect information, and that there is much in the debate that has ensued around the panel's recommendation, and that preceded the panel's work, that really I think would yield nicely to, and should become the focus of, continued research investment at OERI. That is really the focus I have tried to bring to the agency.

There are a number of really important questions that I think deserve our attention. You know, should students be allowed to use calculators and under what circumstances? What is the balance that ought to be struck between instructional activities that require students to memorize and practice their multiplication tables, like my elementary school kids do today? And how are these things put together in the curriculum?

We ought to go ahead and study some of these things much more vigorously and see if that helps us with the debate.

And the third point I want to make is simply that we have learned, I believe, quite a bit from this current generation of expert panels. We know, for instance, that it is a much harder activity in which to engage than I believe people had imagined. The resources required to do them well, I think we underestimated. The time it takes to do this job well, I think we underestimated.

And so we will use that knowledge as we continue to work in this . . . on these endeavors. And should the Congress continue to want us to, we expect to get better and better at it.

Mr. Chairman, thank you very much.

See Appendix F For The Written Statement Of Kent McGuire, Assistant Secretary, Office Of Education Research And Improvement, U.S. Department Of Education, Washington, DC.

Mr. Castle. Thank you very much, Dr. McGuire. We appreciate your testimony.

Next we will go to Dr. Milgram, who I think came the furthest of any of the witnesses, and we appreciate that.

Can all of you move the microphones closer, so we can hear you throughout the whole room.

Mr. Milgram. Is this working?

Mr. Castle. Maybe even a little closer.

Mr. Milgram. Okay. How is this?

Mr. Castle. Okay.

The Statement Of James Milgram, Professor Of Mathematics, Stanford University, Stamford, California.

Mr. Milgram. Okay. Mr. Chairman and everyone, I am honored to be here today to talk about the state of mathematics in this country with the distinguished members of this joint committee.

Let me start out by saying that the K through 12 teachers in this country are dedicated professionals. I have the utmost respect for them. But all too often their knowledge of mathematics is extremely superficial, and when this happens they are easily swayed by trendy and unproven programs which typically offer a superficial or shallow treatment of the subject, leading to weak backgrounds in their students.

I am a research mathematician at Stanford University, but two things obligated me to spend much of my time for the past three years studying issues related to K through 12 mathematics. The first was a sequence of courses I gave in New Mexico where I had too many bright, very highly motivated students in my math classes, whose third-rate K through 12 educations in mathematics could not be overcome no matter how hard these students were willing to work.

The second came from the Commission designing President Clinton's proposed national 8th grade mathematics exam. The Commission, including many of the foremost math education specialists in the country, distributed a list of 14 proposed problems. I and my colleagues at Stanford were amazed to find that three of the problems have serious errors. One was so ill-posed that it could not be solved, one had an incorrect solution included with it.

We later testified to that Commission about these difficulties, and it became clear that the level of mathematical understanding on the part of the educators . . . math educators on that panel was unimpressive. I was disturbed when I realized that it is these people who are determining the mathematics that our children learn in school.

I was especially disturbed in view of the dramatic drop in content knowledge that we have been seeing in the students coming to the universities in recent years.

This has been mentioned. Since 1989, the percentage of entering students in the California state university system, the largest state system in the country, that were required to take remedial courses in mathematics has increased almost two and a half times from 23 percent in 1989 to 55 percent today. And CSU's mission is restricted to the top 30 percent of high school graduates.

This failure has important consequences for the nation. Although large numbers of U.S. students entering the universities say they are interested in majoring in technical areas, very few get such degrees today. In fact, the number is approximately 28,000 annually.

On the other hand, there are about 100,000 new jobs in these areas each year. Last year, Congress had to mandate an additional 142,000 new work visas for technically-trained people, and these visas were used up by June 11, 1999, so great was the demand for these qualified non-citizens. A large part of the blame rests with the mathematics programs of the type recommended by the Department of Education recently as exemplary and promising.

These programs are all designed to closely align with the 1989 NCTM math standards . . . standards which explicitly assume that calculators are always available, and as a consequence of this students never develop a mastery of basic arithmetic operations.

The standards also require . . . and this is, in a way, more important . . . that skills in algebra be downplayed. And as was mentioned, again, skills in algebra . . . not the formal skills with changing letters, understanding that numbers can be represented by letters, but the skills with symbolic manipulation . . . are the single most important determining factor for success in college.

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And so let me explain this a little more. The co-chairman of the expert panel, Steven Leimwand, who was also one of the designers of the 1989 NCTM standards, recently stated that the curricula endorsed by the Department of Education, and I quote, ``create a common core of math that all students can master." Not material that all students need to know or should master, simply material that he believes all students can learn.

The support for these programs in the Department of Education is ultimately the responsibility of EHR at the National Science Foundation. EHR funded the development of at least six exemplary and promising programs. And it is also probably worth noting that at the present time there is no valid research that shows that any of these programs of this type are effective.

In conclusion, I believe that the sad state of mathematics knowledge among high school graduates in this country is primarily the responsibility of two agencies . . . the Department of Education and Human Resources at the NSF, and the Department of Education. The programs they develop and aggressively push simply set too low a standard.

Thank you.

See Appendix G For The Written Statement Of James Milgram, Professor Of Mathematics, Stanford University, Stamford, California.

Mr. Castle. Thank you very much, Dr. Milgram, and we will go to Dr. Schwartz next. We will just stay in the order in which you are sitting.

The Statement Of Mark Schwartz, Parent, Livonia, Michigan.

Mr. Schwartz. Thank you. Mr. Chairman and esteemed members of the committee, thank you for inviting me here today. I speak today as a concerned father. I also speak as a business owner and employer of engineers and computer scientists. In 1993, a radical approach for teaching mathematics to high school students called Core Plus was adopted at Andover High School in Bloomfield Hills, Michigan.

In the summer of '97, several, if not all, of the first wave of Core Plus students who took math placement tests at college experienced difficulties with these tests. Horror stories from the freshman college years of Andover graduates, with several years of Core Plus training, were told directly to the Bloomfield Hills School Board and school district superintendent, to no avail.

One tactic of these administrators was to meet with the parents individually and blame their child's math difficulty on not being a good student. A second strategy was to blame the college which gave the entrance exam for not being forward thinking. When the school district stonewalled all requests to even investigate the cause of the Core Plus graduates' problems, a number of these parents, including myself, joined to form

Bloomfield Hills Parents for Excellence in Math Education.

This is a grassroots effort to support the best math curriculum for all students. Rather than trying to completely throw out the reform math program, our organization requested choice of a traditional math program in addition to the Core Plus. We believe that parents should be able to make their own decision on such an important issue.

Bloomfield Hills parents collected signatures on a petition for choice, went to School Board meetings, held our own meetings, and attended school-sponsored discussions. The Bloomfield Hills school district used all its resources to push the Core Plus program and reform education.

Finally, in an attempt to assist Bloomfield Hills parents and resolve the issue of the effects of Core Plus, Professor Bachelis of Wayne State University singlehandedly took on the task of investigating the impact of Core Plus by way of an extensive survey.

Bachelis' survey of the class of '97 was next analyzed by Professor James Milgram of Stanford, who we just heard from. As a result of our organization's efforts, but primarily due to the press given the work of Bachelis and Milgram, Bloomfield Hills school district felt sufficient pressure to bandaid Core Plus by adding back more quantitative problem solving.

The take-home lesson is that programs which are such a radical departure from the time-tested ways of teaching mathematics cannot be introduced in a wholesale fashion. The Bloomfield Hills school district should have provided a safety net for the Core Plus student pioneers.

New new math proponents have been shown to be willing to use high school students as guinea pigs. If medical doctors experimented on our children in the same fashion the school districts do, they would be in jail.

I would like to give some analogies to the business world. In the early 1980s, the American auto industry was under assault. The oil embargo and its resulting high gas prices gave the Japanese a foot in the door with their subcompact vehicles. We watched as General Motors lost market share and the U.S. Government had to prop up Chrysler. The overseas pressure forced a reluctant U.S. auto industry to completely transform its operations, policies, and culture.

The educational system is precisely where the U.S. auto industry was in 1980 . . . institutionalized, inefficient, and stagnant. The only thing that could have forced GM to change was competition. The same is true of today's educational system.

The Justice Department recently filed suit against Microsoft for monopoly practices, and then suggested that Microsoft may need to be split into three companies. Yet each year Microsoft delivers more software, better software, and cheaper software for consumers. They have done this so successfully that Microsoft is now one of our nation's jewels.

Meanwhile, the Justice Department ignores the largest monopoly in the world . . . the United States public education system. Each year the public schools deliver lower quality students and spend more money doing so. They produce students who are not

prepared to compete in the modern world. They stifle the efforts of teachers, and they alienate the consumers. Our public school systems need to be held accountable to their consumers, parents, and students.

To truly transform the public education system, we must do what the Japanese did to our auto industry. We must put pressure of competition into the equation. We must give parents choice.

Our founders recorded this wisdom in the 10th amendment by reserving these issues to the local community. Now some will argue if we are to give parents choice, the public school system will suffer. I disagree. Our public schools will not fail because of choice; they will innovate.

Thank you.

See Appendix H For The Written Statement Of Mark Schwartz, Parent, Livonia, Michigan.

Mr. Castle. Thank you very much, Dr. Schwartz.

Ms. Sarhady is next.

The Statement Of Susan Sarhady, Parent, Plano, Texas.

Ms. Sarhady. Thank you for the opportunity to speak here today. It is truly a privilege. It is difficult to know how to condense the issue that has consumed my life for over a year and a half to a mere five minutes. I sit before you as a representative of the numerous parents who have related their stories to me.

This is the story of my friend Sally, whose two boys took an entrance exam for a private school. The youngest, in his first year of Connected Math, qualified for admission, but the oldest, who was in his third year of Connected Math, didn't because of his lack of algebra skills.

This is the story of my friend Melinda, whose gifted son has never scored below a 90 on any portion of the Iowa Test of Basic Skills, who during his second year in Connected Math scored a 74 on math computation. There are many, many, many more stories, and certainly not enough time here to tell them all. But I have brought some letters from parents who wanted their stories to be heard, and I ask that those be added to the official record.

Whether you agree with the concept of reform math or not, you must agree that it is controversial and without a proven track record, and that alone is of great concern to parents. In 1996, our school district became one of the first six districts to participate in the Texas statewide systemic initiative pilot of Connected Math. Four middle schools in

our district were chosen, without School Board approval, without parental approval, without so much as a public meeting, completely bypassing, with the aid of federal funds . . . the theory of local control.

A letter from the school district allowed for the release of identifiable, individual student test information without any kind of parental approval or notification . . . a clear privacy violation. During the third year of the pilot, despite strong opposition from parents, the Connected Math textbooks were adopted for use in all of our middle schools by unanimous vote of the local School Board.

Section 26003 of the Texas Education Code says in part, ``A parent is entitled to request, with the expectation that the request will not be unreasonably denied, the addition of a specific academic class if sufficient interest is shown in the addition of the class to make it economically practical."

We have yet to be granted the addition of an alternative to Connected Math, despite the fact that we have tried everything from filing a grievance before the School Board to an appeal to the Texas Education Agency to a costly petition drive that resulted in over 600 petitions from the parents of students asking for an alternative. As a last resort, six parents even filed a federal lawsuit last fall.

Last October, I was amazed to read that the Department of Education had issued a report calling Connected Math exemplary. Within days, our school district had principals handing out copies of the press release at parent meetings. They also made sure the local newspaper got a copy, and, of course, it made front page news.

The secondary math coordinator in our district was quoted as saying he considers the selection of Connected Math a vindication of the district's choice to implement it. Parent opposition to the program doesn't seem to matter to the school district anymore.

Millions of dollars have been spent to design math programs that align themselves with the NCTM standards. Millions more are spent by the statewide systemic initiatives to ``reform science and mathematic education for all of its students by reforming curriculum and assessment through changes in teacher development."

After that, even more is spent to issue a report saying the end product of the millions spent is exemplary. But the effect of all this money spent on child achievement is exemplary. Achievement is a hotly debated topic, and most conspicuously parents have been left out of the whole process.

You asked what role the Federal Government should play in improving mathematics instruction in our schools. I would ask that much stricter controls be put in place to prevent schools from using untested programs without the informed consent of parents and students. True local control must include from the outset not just administrators but parents.

Some of us have the fortitude to do battle with our local school districts, if necessary, but we cannot take on the Federal Government as well. At the very least, these types of federal initiatives should first do no harm.

See Appendix I For The Written Statement of Susan Sarhady, Parent, Plano, Texas, and additional materials submitted for the record.

Mr. Castle. Thank you very much, Ms. Sarhady. We appreciate that.

And Dr. Rutherford is our cleanup hitter.

The Statement Of James Rutherford, Education Advisor To The Executive Officer, American Association For The Advancement Of Science, Washington, DC.

Mr. Rutherford. Mr. Chairman, members, thank you for the opportunity to be here and explain to you and for you some of the work of the expert panel. The panel itself is composed of really highly qualified people. They are knowledgeable. They are experienced. In one-way and another, they have been working in science and mathematics education, most of them for decades.

They are, without exception, committed to the notion that our students should become the best in the world in their understanding of mathematics and science, and they are willing to work toward that end.

Collectively, as a group, as a panel, it seems to me that they match the nature of the work that had to be done. This is a group that was going to help set policy and design procedures in science and mathematics education. And, hence, it seemed appropriate that they come from classrooms, teachers, people who are responsible for curriculum and overseeing programs in the schools, people who train teachers in mathematics and science, science and mathematicians, individuals who work for organizations that care, such as the Council of Scientific Society Presidents and the National Academy of Sciences.

So it was an appropriate group and a well-connected group, connected to the schools, connected to science and mathematics, to higher education, and to the history. Even so, it didn't feel it was entirely prepared for this undertaking and spent a good deal of time in preparation itself.

We read background papers and talked about them and shared ideas. We looked at what research had been going on. We brought in experts to talk to us about the nature of the research and how you find out how various programs work and don't work.

The committee studied, for example, the chapters and benchmarks for science literacy, a document that covers science and mathematics and technology learning, that spent two years investigating all of the research in the English language, and some in other languages, bearing on the learning of science, mathematics, and technology. So it seems to me they were the right kind of people and properly prepared.

I speak for myself, not for the panel as a whole. I have no authority to do that because that charge is much too sweeping. The legislation referred to all grade levels, full range in science and complexity, deal with educational policy, research findings,

practices and politics, much too much for a group to do in a reasonable period of time.

So after much discussion and examination, the panel decided that its main responsibility would be to design an effective, fair, and manageable process for assessing K-12 science/mathematics instructional materials, including defining the criteria to be used in the process and the nature of the process itself.

It intended to move the process of making judgments about materials, as well as it could, away from anecdotal kinds of information to more systematic and objective sorts. In that light, then, the panel did not see itself as the primary reviewers of instructional materials but as people who would design a system and oversee its use.

At best, they could do a reasonable first version, but build it in such a way that it could be improved upon and expanded with time. The panel worked, agreeing upon a criterion. It worked on design. It tried to figure out how the reviewers . . . after all, we didn't even know how many there would be . . . what would they need to know? What kinds of skills? How could it be arranged so that you would have a systematic and fair-minded when no one submission would be reviewed by the same panelists?

In the process, then, to make sure that we were on track as it begins to crystallize, we actually ran pilots. We found out how to get people to do this kind of assessment. We had them assess the materials. We examined their reports. They were all interviewed, and we learned from that process.

A third party group was brought in to observe the process of the panel itself and submitted a report indicating that it was making headway towards developing clear and coherent criteria and indicators. Its pilots were well conceived and informative, and it was working in a way to reach consensus.

I won't describe the review process, but to accept that it involved two panels looking at each submission, to deal with the criteria, to make decisions, citing evidence, citing the arguments for their evidence, and citing the reasoning for their rating. These were returned, and to the degree they seemed promising then they went to a separate panel that was composed of experts in the process of impact in educational matters.

So that is how the process worked. The panel itself only came in at the end of the process to see if it had been properly carried out by the process, and to look at these various reports and try to come to some decisions, which it did.

I hope, Mr. Chairman, that there can be some talk about the future of this because the panel, after three years of experience, I think, is in a position to provide interesting insights and ideas individually on how the process might be improved or how the whole thing might be reexamined.

Thank you.

See Appendix J For The Written Statement Of James Rutherford, Education Advisor To The Executive Officer, American Association

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For The Advancement Of Science, Washington, DC.

Mr. Castle. Thank you, Dr. Rutherford. We appreciate that. I am not sure how much in depth we can go into how to improve the particular process today, but it is interesting to hear you say that.

The time has now come for all of us to ask questions. Please keep a couple of things in mind. One is get the microphones as close possible. There is a way it can be too far away. Secondly, be as brief as you can because each of us has five minutes. I hope mine hasn't begun yet.

Each of us has five minutes for questioning. I would like to ask a few witnesses questions, and perhaps we can avoid asking the panelists the same questions twice.

If we could ask Rachel to come to the table. I would like to begin with her. So if she could go there, we will start the questioning now.

Rachel, as I understand it, and maybe I am wrong about this, but I think you experienced some form of this new math teaching. I would like to hear, you will have to do it briefly, but I would like to hear your reaction to it. In addition, I should point out to anyone who wasn't here that you are a good student with a very good academic record.

Ms. Tronstein. Thank you. Yes, I went through four years of a Core Plus curriculum. I was in the accelerated program, and I also had many advantages over most Core Plus students. I first attended a private day school with a very traditional math program. I was enrolled in Algebra II in 8th grade, which traditionally is the curriculum for a junior in high school. So I had a very good, solid understanding of the fundamentals of math.

I then entered Andover High School, where I was in the Core Plus curriculum, and I went through four years. I took Calculus my senior year because I was in the accelerated track, and also I received private tutoring for my entire four years of high school because my parents were concerned that I wasn't getting a very good understanding of the fundamentals and basics of math.

And I also attended Stanford University's summer session for high school students in the summer of 1998, and I took a remedial pre-calculus course. It was the same course that I had just finished at Andover High School. I went . . .

Mr. Castle. Dr. Milgram was your teacher?

Ms. Tronstein. No. GSI. And a lot of those concepts were concepts to which I had never been exposed, which was obviously very frustrating because every other student in the class had.

Right now, I am a student at the University of Michigan. I am a first-year student. I took Calculus I fall term. I received a B minus, while in my other three classes I received A's, and I worked harder in the Calculus course. And I would just like to tell you a few problems that I see with the Core Plus curriculum.

In theory, it is fabulous. However, it fails to teach students basic mathematical skills required for postsecondary educational success. It creates a calculator dependency. And, sure, you can compute an answer, but you have no understanding of how or why that answer is correct, which does not enable you to understand further calculations or applications.

What would be better is to use a calculator with a traditional math program, so you have a visual representation of the problem at hand and you can solve the problem with traditional and reform math.

And also, it created a group of students who are ashamed of their math ability. Many students have shied away from math courses, and also science courses such as physics or chemistry, because they are afraid that they don't have the mathematical basis to succeed in these courses.

That is not the goal of education. It should open doors, not close them. And that is basically it. It created a group of students graduating from the 14th best public school in the nation, according to Newsweek, who shy away from math and careers that are math-oriented because of this curriculum.

See Appendix K For The Written Statement Of Rachel Tronstein, Student, University Of Michigan, Ann Arbor, Michigan.

Mr. Castle. Thank you, Rachel.

I would like to ask further questions, but I want to go to Dr. McGuire before my time elapses here. Maybe I may not have this quite right, so feel free to correct me if I get it wrong. Basically, I don't know if I totally understand the purpose of the Federal Government through the Department of Education. Actually, it is a broader Department of Education issue, not just a research issue, offering guidance on the teaching methodologies which are available.

I understand you and OERI, the group you work with, are doing the research for that, but I am a little surprised that they have offered something, new and different that is not working particularly well. So I would just like to hear your thoughts on that.

I would also like to hear your thoughts on the status of all of this today? I know this has been somewhat controversial, and you have received the letter which Dr. Milgram initiated. Is the Department still supporting this? Are you reviewing it? Where does it stand today in terms of your support of these concepts?

Mr. McGuire. Let me answer your second question first. The math and science panel is not quite done with its work yet, though we certainly expect it to complete its work in the next several months. There are some science recommendations that are forthcoming.

There are several other panels operating, all at different stages of completion in their work. There is a technology panel that is I think soon to bring recommendations to the Secretary. There is a gender equity panel that has a set of recommendations it is prepared I think now to bring to the Secretary. There is a safe and drug-free schools panel

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that isn't quite ready to do that.

And these panels have a number of different histories, in terms of why they have come to exist and the like. So we have several panels going on. They are all at various stages in their work.

Congress, remember, asked us to take this task on. In fact . . .

Mr. Castle. Asked who?

Mr. McGuire. It is required in our legislative authority that we do this. I wasn't here then, but I suspect that there is a legitimate interest and concern on the part of the Congress to see that we get out to the field as much information and insight into the quality of all kinds of things. So what we are doing here is making a good faith effort to interpret and exercise that authority.

Mr. Castle. My time is up, and I am going to have to pass the baton to Mr. Kildee. I understand what you said about what Congress did originally. Actually, it is going to be Mr. Martinez, the order in which people came.

I understand what you said about that, but to me it is a confusing message because it has the form of not just a recommendation but also an endorsement. That is the message which I have heard here, and before this hearing is over I would like to get that straightened out a little bit. I'll just tell you that for background. Let me turn to Mr. Martinez.

Mr. Martinez. Thank you, Mr. Chairman.

Dr. Rutherford, when the panel was created in Congress . . . and I remember when Congress began putting this together . . . we expected that you were going to form a panel that would find successful programs and disseminate that information to various school districts, never with the intent that you were saying that you have to use this program. None of these programs have been mandated, have they?

Mr. Rutherford. They certainly have not been mandated, and I can tell you that the panel members, being the kinds of people they are, would not have been engaged in an enterprise in which they were going to tell school districts how they should run their business, including what they should use and not use.

Part of what they thought they were up to was to provide the very thing that would make that GM analogy work. The traditional programs were not working back in the first international assessment, the second international assessment, the third international assessment. Competition is needed, and a lot of what these programs that are being looked at . . . is providing some competition, which may or may not work, incidentally, but provides the main publishers, who are the GMs of the day, to reconsider.

So the panel didn't think it was mandating anything but trying to seriously look at what the possibilities were with regard to instructional materials.

Mr. Martinez. Isn't it true that the program in Connecticut, and have already proven in Connecticut, that it has raised math scores by 20 percent? And that that is one of the programs that is recommended by the panel?

Mr. Rutherford. I don't remember, Mr. Martinez. We looked at lots of programs. I don't remember the details. I can only say this. That I have been in education looking at things for 50 years at least, and it is almost always possible to find data and evidence to support a program. And it is almost always possible to find data that contradict it.

I have been on both sides of that, and so part of what the panel was trying to do is to see if it would be possible, get some series and put some process in it, that there could be a convergence in the ways in which information data were accepted to determine what was successful and not.

Mr. Martinez. Then, in that instance, start the problem Ms Sarhady mentioned, as I understand it, is really with the School Board that has insisted on using this system that the constituency there does not want used, is that right?

Ms. Sarhady. Yes, although it is a little bit more complicated than that. Because the teacher training is provided under the Texas statewide systemic initiative when the pilots were first begun, and that basically, then, is federal funds to train for a program that was implemented without School Board approval at that time.

Three years later, enough teachers and administrators, if you will, thought that the program was absolutely wonderful, and so we really didn't have a chance to try to get a word in edgewise to say, ``Wait. Let us hold off a while.'' It had already been in place for three years before parents got to stand up and say, ``hold on now.''

Mr. Martinez. Is the School Board responsive to you? Is the School Board against using this program, or is the School Board ignoring you and going ahead with it?

Ms. Sarhady. They voted unanimously to adopt the textbooks.

Mr. Martinez. It appears that your problem is with your School Board. Those School Board members are elected members, correct?

Ms. Sarhady. Yes.

Mr. Martinez. And it is your constituency that elects them. How many Board members are there? Are there more than five?

Ms. Sarhady. Seven.

Mr. Martinez. Seven? Do you have elections where four run and then three run?

Ms. Sarhady. No. Two, two, and three.

Mr. Martinez. Two, two, and three. So there are staggered terms. Well, constituents who are dissatisfied can eventually select a new School Board that will support their programs.

Ms. Sarhady. Again, I would agree, although the point was is that the pilot was undertaken without any parental notification, without any School Board approval. And so by the time three years of that pilot had gone by, anybody that wanted to raise any concerns, it was basically too late in the process for parents to get involved and make a difference.

Mr. Martinez. Who were the people that actually mandated that?

Ms. Sarhady. Well, it came by way of the Texas statewide systemic initiative, yes. And the school district agreed to participate in the pilot.

Mr. Martinez. It appears that the problem there is with the state, because the Federal Government did not mandate that program. We gave the state funds and told them that we expect certain success rates, but the Federal Government tries to make the people or entities that are receiving funds as accountable as possible for the way that money is used.

Ms. Sarhady. Yes. But it is my understanding that the Texas statewide systemic initiative has never issued a full report of any success with that program. In addition to that, the only test that has been used, certainly in our district, possibly in all of the other districts as well, is the Texas assessment of academic skills, which is, by no stretch of the imagination, an achievement test. As a minimum . . .

Mr. Martinez. Here again, I say that the problems exist with your local School Board and your state. I read a report recently of the so-called tremendous progress in education in Texas, and it turns out that it is not true in many cases.

Mr. Castle. Thank you, Mr. Martinez.

We will now go to the Chairman of the full committee of education, Mr. Goodling.

Mr. Goodling. I think in response to the last discussion that was going on, I am afraid federal dollars and federal established expert panels sometimes takes away the good, common sense thinking of the locals and the state people. I hate to think we are that powerful, but I am afraid that that is possibly true.

I would like to believe what we are saying, Assistant Secretary McGuire, in relationship to what NAEP said, as far as improvement in math is concerned. Unfortunately, I believe the Department at the present time is, as a matter of fact, scrutinizing just how that test was carried out.

We have discovered, I believe, that an awful lot of people were kept from taking that test, and unfortunately, that is the problem we run into. When you talk about increased standards and higher assessments, then all of a sudden people find all sorts of great ways to make sure that they don't look bad as you are reading about in New York at the present time.

My fear is how widespread it was to pull students who obviously weren't going to do well from taking the test. That takes away everything we wanted to find out.

There is no legitimacy to it.

The other observation is this is frightening to me because I don't understand it. Secondly, I hope it isn't saying that we are going the spelling route because it is important to understand the students language in order to decide whether or not their work has good content.

One of the experts were supposed to have said it is time to recognize that for many students real mathematical power on the one hand, and facility with multi-digit pencil and paper computational algorithms on the other, are mutually exclusive. In fact, it is time to acknowledge that continuing to teach these skills to our students is not only unnecessary but also counterproductive and downright dangerous.

I am not sure that the statement isn't downright dangerous. It is kind of frightening to me. I am not as patient as I once was, but every time I stand in line to pay my bill and it is $20.07, and I give the clerk a $20 bill and a nick and two pennies, because I don't want a whole bunch of change, I realize I am holding this line forever, because I have just thrown a real curve ball to that poor clerk.

I hope that doesn't have anything to do with whatever this paragraph is that I just read. I went to my expert, and I think he is going to have some questions on that also because maybe I am not the only one that doesn't understand what it means. I hope it doesn't mean that knowing what you have said is more important that learning to spell.

And I yield back my time.

Mr. Castle. Dr. McGuire, if you want to respond briefly, and the Chair may have another question, go ahead and do so.

Mr. McGuire. Very briefly. I mean, I think . . . this quote I think . . . I worry about whether it is in proper context. I would really point to Jim's important remark that the panel, I don't think, understood the issue in those terms. The Department is as concerned with respect to the NAEP issues as you are, Mr. Goodling, about inclusion. We just have to work on that. And we certainly don't endorse any particular approach in curriculum or in instruction.

Mr. Castle. Thank you, Mr. Chairman.

Thank you, Dr. McGuire.

Mr. Kildee?

Mr. Kildee. Thank you, Mr. Chairman.

Regarding your previous discussion, Mr. Chairman, with Dr. McGuire the genesis of this situation lies with Congress and not with the Department. In Goals 2000, passed in 1994, Section 941(d), we required that the department make recommendations on the quality of programs. So the genesis is with the Congress here, and this bill was written on Capitol Hill, not Mount Sinai. So we may want to . . .

[Laughter.]

. . . take a look at it also ourselves. I just want to point that out.

I'd like to ask a question of Dr. Milgram. In California, there are over 30,000, maybe 40,000 teachers who are teaching without regular certificates, or are teaching outside teaching field. Are there many teachers teaching math in California, or throughout the country for that matter, who are teaching outside their teaching field?

Mr. Milgram. Well, I can only answer for California.

Mr. Kildee. Okay.

Mr. Milgram. We have an exam called the CBST, which is designed to test teacher competence in basic fields, one of which is mathematics. Now, the CBST exam is written to a 6th to 7th grade level. Better than 70 percent of the elementary school teachers that take the exam fail it.

Mr. Kildee. That is alarming.

Mr. Milgram. It is, indeed, alarming. And the teachers are certainly a large . . . that came out wrong. The teacher preparation in the subject is a very major problem that we have to deal with. And somehow my view is that that is the primary problem we have to deal with, that putting in experimental curricula only compounds the problem that the teachers have to deal with.

So, in California, we are preparing to spend an enormous amount of money over the next summer and the next year to just upgrade teachers' skills. And then when we get this kind of a curve ball from above, saying, oh, back off from what we have been doing for the past three years, it kind of makes it very difficult for us.

Mr. Kildee. At what level do we make the transition in the K-12 curriculum from just straight arithmetic to math? Let me make a distinction. At what level should we be making that transition from straight arithmetic to mathematics?

Mr. Milgram. Well, the current . . . I mean, trends for the past, I would say, about 15 years have been to start introducing concepts in algebra and geometry already in first grade, and to some extent even in kindergarten. So the current trend is . . . and this is across this country as well as internationally . . . is to introduce all of these concepts together.

In international programs, such as Japan, Singapore, Germany, Hungary, Russia, this seems to work very well, and they come out with very well-educated students that perform admirably, it appears. In this country, it is still confusing.

Mr. Kildee. We really do very little math in the early grades. We do more arithmetic in this country don't we?

Mr. Milgram. We do more arithmetic, but the concepts are being introduced. So, yes, even in first grade you will see standards that say students should understand that

numbers . . . that letters can be substituted for numbers.

Mr. Kildee. Okay. Let me ask a question of Dr. McGuire. One of the topics mentioned in the open letter to the Secretary was concern that there were too few mathematicians on the expert panel. Was there a specific reason why there were not additional mathematicians on the panel?

Mr. McGuire. Let me just, as I get ready to answer that question, introduce my colleague Linda Rosen, who I am glad you agreed could join us at the table during this question and answer period. She is responsible for the Department's initiatives in mathematics, and it struck me, given the nature of the discussion here, good to have her.

I think that a very good faith effort was made three plus years ago to put this panel together in a way that would be broadly representative of the interest in the math and education community. I wasn't involved in that process at the time, but as I have asked questions about it what I have come to understand is that there was no conscious decision to ignore mathematicians in the research community, but, rather, a number of people sat down and tried to think about leadership in the math community, what would give this effort a kind of faith validity, if you will.

A set of names was then assembled and recommended to the then Assistant Secretary, Sharon Robinson, who apparently made the decision that this was a sound and qualified group to engage in this work.

Mr. Kildee. Thank you, Mr. Chairman.

Mr. Castle. Thank you.

Mr. Goodling. Mr. Chairman, could I correct . . .

Mr. Castle. Mr. Chairman?

Mr. Goodling. For the record, I should correct my mathematics, because the example I gave didn't make sense.

[Laughter.]

What I should have said is my bill was $19.67, and I gave them a $20 bill and two pennies.

[Laughter.]

And got them all messed up.

[Laughter.]

Mr. Kind. That is all right, Mr. Chairman. We had a calculator on this side.

[Laughter.]

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Mr. Castle. Mr. McKeon?

Mr. Goodling. That came from Congressman Kind.

[Laughter.]

Mr. McKeon. Thank you, Mr. Chairman.

The thing that keeps resounding in my head as this whole thing is being discussed here is unintended consequences. I think the Congress probably had good intention of trying to improve something. We probably heard there was a problem out there with math, and we thought, in our superhuman powers here we could fix that. So we passed a law. Fortunately, it was in '94. I am glad you said when that happened. It is good to put that in its proper perspective in history. We try not to do those same mistakes now.

But then the members of the Department and the Science Foundation went to work to carry out those wonderful intentions of Congress, and maybe some mistakes were made along the way because somebody that understood the process a little bit better was left off the committee.

But the problem is, down at the end of the row, we have students that are used as guinea pigs, and it is very hard to go back and make up three years of their life. That is the thing that really bothers me.

Could you, Ms. Sarhady, very briefly, just give me a definition of ''connected mathematics''?

Ms. Sarhady. It is a three-year integrated mathematics program for grades 6 through 8 that uses primarily what we call discovery learning rather than traditionally presenting one subject . . . not subject, but one item after another.

Mr. McKeon. That is good enough.

Ms. Sarhady. Sorry. You discover the concept presented in an investigation.

Mr. McKeon. Great explanation.

And, Ms. Tronstein, could you do the same with Core Plus?

Ms. Tronstein. It tries to teach cooperative learning and application of math to real-life situations.

Mr. McKeon. As Dr. Milgram has stated, when we come up with these new things, and already have a lot of teachers that aren't prepared to teach traditional methods, then throwing another method on them, indicates we are heading down the road for some real problems.

We had this with reading. We came out with a new method to teach reading, and that caused a lot of problems in California. Now it looks like we are doing the same thing with math. Sometimes I think these things happen because a teacher maybe has been

teaching math for five years under the traditional method has gotten bored with it.

Maybe they are looking for some new way because they are bored with teaching the same thing for five years. But for each of their students, it is their first time hearing it. I used to sell life insurance. When I was first hired, they gave us a little book and said, ''here is how you sell pension plans.'' I used that flip chart a couple of times, and I got tired. I developed my own way of selling pensions.

Well, I never sold a single pension, but the fellow that led the company year after year after year selling pensions still kept using that simple little flip chart. He may have gotten bored, but he was able to overcome that and use that same method because every client that he came to, it was new to him. He was able to put freshness into it, and he was successful. Not me. You know, I moved on and did other things.

But I am concerned, when we have a lot of teachers that are inadequately prepared, and we have students that are suffering, maybe what we should do is instead of finding a new way to teach math, maybe we should go back and teach the teachers how to teach the traditional ways and encourage them to do that and do it more successfully. Then we don't end up with these children that have suffered through this period where they have been used as experimental guinea pigs.

Some way, I think we need to get back to that, and instead of all of us sitting here, coming up with all new things, we should just give them the resources to train on the old traditional methods that work.

Dr. McGuire? Dr. Milgram, what . . .

Mr. Milgram. It sounds awfully good to me.

Mr. Rutherford. Well, it sounds good if you are sure those methods work. Why is it that when we were doing traditional teaching all the way we were getting such low marks in international grades? Some of these new programs, incidentally, are modeled after our competitors, such as Japan, who used cooperative learned, who used discovery approaches. So . . .

Mr. McKeon. They seem to do it better, if that is . . .

Mr. Rutherford. Well . . .

Mr. McKeon. I am just concerned that I am not so certain that these methods didn't work. I am concerned that maybe the teachers were not taught how to adequately use those methods, and before they were given a chance to do that we moved them into something else.

We had a teacher when we were doing the hearing on our Teacher Empowerment Act that said he was thrown in a classroom of third graders and said, ''teach them how to read.'' He had never been taught how to teach somebody how to read. And if we haven't taught somebody how to teach math but expect them to be able to do it, I just think we probably need to do a better job of preparing our teachers.

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I am way over time. Excuse me, Mr. Chairman.

Mr. Castle. Thank you, Mr. McKeon. We appreciate all of those insights.

Mr. Roemer is next.

Mr. Roemer. Thank you, Mr. Chairman.

It seems we all recognize that we have a major problem, that our students in this great country are not performing well enough in math and science in comparison to other countries, that Congress has acted to extend visas to bring people into this country (which ran out halfway through the year) that the technology companies still have hundreds of thousands of job openings in this country in math and science and computer fields that we need to fill, that we have too many teachers that are not certified in math and science.

But I think we need to look beyond the scope of this hearing and look for answers rather than point at problems. And some of the answers, it seems to me, need to address, how can we recruit the best people to serve on these boards that make recommendations? They don't make mandates to our local school boards and states. They make recommendations that schools can use.

It is the local schools' decision-making authority whether or not to implement the recommendations of these expert panels. So how do we get the best people to serve on these boards? How do we recruit more math and science teachers?

How do we improve our in-service programs and our professional development programs to teach people new ideas in order to challenge children? It seems to me that this is what we should really be looking at and not necessarily blaming a panel that makes recommendations.

Dr. Milgram, have you . . . we appreciate your constructive criticism in this area. Have you ever served on one of these panels or been asked to serve on one of these panels?

Mr. Milgram. Not on the expert panels, no.

Mr. Roemer. Would you serve on one if you were asked?

Mr. Milgram. I would possibly serve on one, but there may be colleagues of mine who would be more qualified to do so.

Mr. Roemer. So you might help Dr. McGuire in recruiting people that would serve.

Mr. Milgram. Sure.

Mr. Roemer. I am sure Dr. McGuire has probably had difficulties finding people to serve on these panels. Is that correct?

Mr. McGuire. It is an ongoing challenge. Absolutely.

Mr. Roemer. And so you have difficulty getting people to serve in these areas who might have the expertise that Dr. Milgram is looking for in order to make some recommendations to states and local school boards on whether or not they ought to adopt some of these practices. Is that correct?

Mr. McGuire. That is true.

Mr. Roemer. How do we get better people to serve?

Mr. McGuire. I mean, it is an ongoing challenge, not so much because people aren't interested in seeing this kind of work happen, it is just that people are really very busy, Mr. Roemer, and they have, as I am sure Dr. Milgram is . . . many responsibilities. And this work takes, as I think Jim mentioned a little earlier, a lot of time to do it well, and people have to be prepared to do it. And so it is really a formal public service . . .

Mr. Roemer. Public service.

Mr. McGuire. . . . to be sure. That is right.

Mr. Roemer. Dr. Sunley, let me ask you a question. I have a bill introduced in Congress to try to make it easier to recruit people in second careers, to come back into teaching, whether they are 40 or 50 years old, who have expertise in math, science, accounting, technology, computers. Perhaps you can give me some more recommendations . . . how do we make this more of a reality?

There are a lot of ways to get this, including second careers. How do we do this in terms of second careers? And how do we do it in terms of recruiting people who might be interested in teaching English, Shakespeare, geometry, into science and math fields?

Ms. Sunley. I think the kind of thing that you are talking about, developing a stronger teaching core with people who have strong backgrounds in math and science, is one of the things that we need to be doing to improve the teacher core. NSF does run some in-service teacher . . . pre-service teacher preparation programs. We also run some in-service teacher professional development programs.

Our pre-service programs, we try to link the math and science departments in the universities with the schools of education, so that there is a mix of good, solid grounding in science with good, solid teaching and learning about how students learn.

I think the kind of thing we would want to do with the people who are making teaching a second career is make sure they get that link between the science and math that they know and understand, and how students learn those subjects, and what kinds of things they can do that will best facilitate that student learning.

Mr. Roemer. I thank you, and thank the Chairman. My time has run out. I certainly would like to explore more of these types of ideas at a future hearing.

Mr. Castle. Thank you, Mr. Roemer.

We will now go to Mr. Johnson.

Mr. Johnson. Thank you, Mr. Chairman.

I am a little disturbed at some of the answers we are hearing . . . especially from the Science Foundation . . . because Buzz Aldrin is a good friend of mine. He and I went through flying school together, and we talk a lot now. He tells me that we cannot get mathematicians, physicists, and scientists to replace those that are retiring in NASA today from our own school systems. We would have to go overseas and get them from schools abroad.

I think that I am going to redirect to Dr. McGuire . . . you know, Dr. Milgram said that at the present time there is no valid research that shows any of the programs of this type are effective. I want you to tell me, one, why you think these programs that you recommend are effective; and, two, how do you recommend them under law?

I thought you had the charter to study, evaluate, and not necessarily pick one system over another.

Mr. McGuire. Well, the first thing I would say is that in my opening remarks I, in fact, asserted that we have a continuing need to do more research, so that we will come to have even more information about how these programs, or I should say the components that make them, work, so that people who are in the business of developing curriculum can draw on an ever-sharper and firmer knowledge base.

At the same time, as the panel went about its work . . . I am in no position to speak as Assistant Secretary to the details of any given program. I want to say that. But the panel did oversee a process that looked for and considered evidence about the effectiveness of these programs where students are concerned. And so . . .

Mr. Johnson. But you recommended one program. You didn't enumerate the value of each program. You recommended one program, I think.

Mr. McGuire. Oh, there is a set of 10 different programs that were a part of this one iteration of the panel's work. And, indeed, you would hope and expect that this is an ongoing process, that over time more programs would be submitted for review, and that the process itself would become ever more sophisticated about how those reviews are conducted.

I don't really view the work, the output of the panels as endorsements of particular curriculum programs. I think . . .

Mr. Johnson. Well, that is the way it is perceived out in the states.

Mr. McGuire. We should work on that perception. Here I think we should understand that what we are trying to do is make . . . this is not easy stuff, to make these judgments. It will always be hard to do in the face of the evidence that is available to us at a point in time.

But you should understand these programs as tools, as guidance, and as . . . and people ought to think about the process that the panel went through to make these judgments and consider for themselves, particularly at the local level, how they might investigate and review and make judgments about curriculum that make sense for their

community.

Mr. Johnson. Yes. But when you put federal money out there for teacher training, they are going to take it at the state level, and they are going to do what you suggest. Instead of suggesting a program that you are not sure works, and according to Dr. Milgram hasn't . . . is that true, Dr. Milgram?

Mr. Milgram. What?

Mr. Johnson. Is your statement that there is no research that shows that programs of this type are effective?

Mr. Milgram. That is correct. There are some papers out there from some of the programs that claim to show this, and I keep hoping that one of them actually will withstand serious scrutiny. But so far, each and every paper that we have looked at has shown flaws such as a misinterpretation of the quote that was mentioned much earlier that algebra is the single dominant factor in degree attainment in college.

This was translated over to courses in math are the single most dominant, and then they showed that one of these programs you took more courses. And then they said, ``it is a success, therefore.''

Mr. Johnson. We are out of time, but I think we have kind of hit on it up here. It is teacher training and the way teachers are able to present the subject matter. Maybe you guys ought to investigate that a little more.

Thank you very much, Mr. Chairman.

Mr. Castle. Thank you, Mr. Johnson.

Mr. Kind?

Mr. Kind. Thank you, Mr. Chairman.

I want to thank each of the witnesses for their testimony today, which it has been very, very interesting. Often times during the discussion and the question and answer session it almost sounds as if we are having a debate about the traditional way of doing things versus new approaches to education.

And I am concerned that often times in the course of debating education reforms, we tend to hold up the past in some type of nostalgic light; if we are not doing it the way things were done before, the way we learned, then it must not be the proper direction to be heading.

I often fear that the greatest obstacle that our kids are facing when in regards to their learning ability are the preconceived notions that we in the older generation have about some very innovative and creative new ideas that are being developed.

But, our kids are learning differently than we did when we grew up. They are processing information differently because they are subjected to a different environment

than we were.

One of the questions I want to pose to the panel is, what is happening in the area of online course material, and what can technology can deliver to the classroom today? Because in my district we are having a tough time recruiting quality teachers in rural school districts and inner city areas.

And the online course material that is available could be a part of the key to the deficiency that some of these school districts are running into, based on the course material that is now being developed, in many instances to address the various state standards and assessments that are taking place at the local level.

I think we are looking at a new wave of teaching possibilities that might address some of the shortages we have in filling quality positions, especially in the areas of math and science. Not that it is going to replace the necessity of having good teachers in the classroom, but rather in transforming the role that teachers are now playing, where they could almost be regarded as doctors in the classroom, diagnosing students and their progress and then prescribing remedial action that needs to be taken with kids that might be falling behind.

It seems very exciting. We are just scratching the surface with these possibilities today. I would be interested to hear any comments that anyone on the panel might have in this area.

Ms. Sunley. I think this is another area in which both NSF and the Department of Education have been involved at somewhat different levels. NSF has really focused on research and have set up some centers of excellence for research and learning technologies that are, we believe, making a real difference in our understanding of how learning technologies can be used effectively, both by classroom teachers and by students in the classroom.

One other thing that we are in process of developing is a digital library for science, math, engineering, and technology education. We believe, again, that this can have long-term significant impact on particularly rural and isolated regions, but also on urban cities in terms of bringing new kinds of ideas to the classroom.

Mr. Klad. Dr. Rutherford?

Mr. Rutherford. Yes, I would like to respond. I think it is absolutely necessary for us to explore these possibilities. The shortage of teachers is going to get worse. The next 10 years is not very promising in that regard. So if we have had trouble bringing people into the profession already, and now have to have a greater shortage, it is time to look at the whole system and how we present material and how we use people and time and technologies and material.

And up to now, the technology part has been rather plodding. A lot of it is the lowest quality stuff . . . fun but not useful. But that doesn't mean that we haven't the ingenuity as a nation to begin to create things, and then build a quality control so that when someone claims they have had an online course in physics that, in fact, you have some way of finding out if those students, in fact, learned the fundamental physics that they are supposed to be doing. But we really have to move aggressively, I think, in that

direction.

Mr. Kind. Mr. Milgram, before my time expires, for the purposes of direction on this committee, could you weigh the challenge that we are facing? Do you see a greater challenge in the area of the content, the curriculum, that our students are being exposed to, or in the area of quality teaching?

Mr. Milgram. Well, I mean, both are absolutely critical, of course. But right now the biggest problem we have is with the content. You know, we have to set things up. In the end, we have to have a stable system, and a stable system means we have to have teacher core. But for now, we are losing students right and left. We have to have content for now.

Mr. Kind. Thank you.

Thank you, Mr. Chairman.

Mr. Castle. Thank you, Mr. Kind.

I notice some of you looking up as you hear a whistling noise here. That is the ghosts of students who feel they have been deprived of a proper math education.

[Laughter.]

I am just kidding. Don't get excited. I think it is an opening window here that we have from time to time.

We now shall turn to Mr. Ehlers.

Mr. Ehlers. Thank you, Mr. Chairman. I was going to comment that I thought it was the ghost of teachers past listening to this.

[Laughter.]

First, a quick question to Mr. Rutherford. The panel that advised on this, is it the same panel or the same sort of panel that recently previewed middle school science texts and said that they did not find any of them acceptable?

Mr. Rutherford. No, sir. The panel you refer to was done under the aegis of the American Association for the Advancement of Science.

Mr. Ehlers. So it had no connection with this at all?

Mr. Rutherford. No, connection with this panel.

Mr. Ehlers. Okay. Perhaps it would be best if this panel had done the same thing, but we will let this rest.

I just want to back off a bit. It seems to me we are talking about angels dancing on heads of pins to a certain extent. Let us just point out some practical problems first. My background is 22 years of teaching physics at the college and university level. During that time I was developing a special course for future elementary school teachers and then

through that getting involved in the schools and teaching in the schools.

I would just like to point out some of the practical problems that I have encountered that I think have to be addressed before we get into some of the esoteric that we have been dealing with here.

The first problem concerns the transient population we have in this country. I recall one teacher telling me that in her school the average number of transfers was such that each student went to four different schools in the course of a year since the parents in that little district moved around a lot.

We know how transient our nation is, and yet we continue to subject our students to the fact that they may in a school which one-year teaches fractions or percentages in the fourth grade. This student leaves after the third grade and goes to another school where they taught those subjects in the third grade. That student never learns theses skills.

I think if we are looking for ways that we can try and improve things on a national level, we should certainly try to reach some national agreement on scope, content, and sequence in mathematics instructions nationwide. That is true.

You may wonder why small countries such as the Netherlands beat us so badly in the TIMSS evaluation. I think it is simply for that reason. They are small countries. They have a standardized program. Everyone follows the same sequence, and they do well.

Another problem is when we introduce a new curriculum, I don't care which one it is, into a school, I find in my experience the biggest problem is lack of proper teacher training. Teachers, by and large, are not comfortable with math and science to begin with, and then you throw in a brand-new program and you don't give them the proper training, the result is disastrous.

I find the teachers are the ones who are most upset about this, not just the parents. You are putting them in an impossible situation if you don't provide proper background and training.

Another practical problem is we grant 100,000 H1B visas in the Congress every year to get enough qualified people in the United States to do the technical jobs that are available. Our grad schools in over 50 percent in the sciences, the students are from other nations. I don't know what it is for math, but I know it is high.

Clearly, we have problems. We are not doing things right. Now, this may be an attempt to do things better. But if what you are saying is correct, we are failing once again by not dealing with some of the very simple practical problems that we should deal with.

I am very strongly of the opinion that reading, math, and science should be taught well and should be taught early. In addition, they should be taught in a way that makes sense because they all interact with each other. Talking about major themes of literature in first grade doesn't work. You need some basic understanding of the material to do it. But if it is taught properly, you can develop an intellectual capability, so when students are in high school and college, they have a wonderful appreciation of literature.

That is true also of mathematics and of science. It is often taught as disconnected little pieces, especially in mathematics. I deplore the things I see in the textbooks. It is all teaching about science, but there is nothing that is involving science. And there is a basic difference there.

I think we are running into some of the problem here. We are trying to introduce the advanced concepts of math early on, which is fine, but the students still have to get the basic background to understand what those concepts mean. And with this whole argument of using calculators versus teaching someone how to calculate with a pencil and paper, or the fancy language of manual computation of algorithms, the point is simply they have to understand what it means to add, to subtract, to multiply, divide. It doesn't matter whether they use a calculator or something else.

Memorizing the multiplication tables cast against some program that doesn't have that misses the whole point. It is just simply a convenience to know those for the rest of your life. It doesn't mean it is a good program or a bad program. It is a convenience, and some of these very basic things I find getting lost all the time.

I decided to use my time for a little sermonizing rather than asking questions.

[Laughter.]

But I am just trying to shed a little light on this to everyone. And I hope that we, as a country, can get our act together here and reach some national agreements on what we really are trying to do and how we can do it. We need to make an effort to develop programs that follow that and not simply let California, Texas, and Florida dictate which textbooks we all have. Finally, we need to train our teachers properly, so that we can implement these programs and do the best job possible.

End of sermon. Thank you very much.

Mr. Castle. Thank you, Mr. Ehlers. Well-received sermon.

[Laughter.]

Mr. Holt, on my right, would like to ask a couple of questions. Mr. Petri, if he has time, would like to ask a couple of questions. Mr. McIntosh might wish to ask a couple of questions.

We are in the middle of a vote. We have 10 minutes left. What we would like to do is to finish before we leave for the vote because that would mean you would have to wait for half an hour. We need brief answers, and hopefully the members can help as well.

Mr. Holt? Sorry.

Mr. Holt. I will limit this to a couple of brief questions because Mr. Ehlers and I see eye to eye on much of this. I would like to engage in a much longer conversation with him and with you about this. I sit on the Glenn Commission, the National Commission on the Teaching of Mathematics and Science.

Recognizing that even the traditional methods haven't worked so well, how do we get the interest of students and teachers?

I recognize that past methods of teaching math haven't worked so well--would say even in my case, and I went on to a number of advanced degrees in physics and have taught, as Mr. Ehlers has, at the college and university level.

As I look at the programs that have been criticized think there are some wonderful things that I would have benefited from if they had been taught. And I think citizens today, not just future scientists and mathematicians, would benefit from learning scheduling of large projects, exponential growth, simulating chance situations, expected values, probabilities, and so forth.

And I am sure all of us here in Congress would benefit from learning reasoning under uncertainty and developing . . .

[Laughter.]

. . . quantitative reasoning with large numbers.

[Laughter.]

The question that I have for Dr. Rutherford and Dr. Sunley and Dr. Milgram, is how, in fact, do we help teachers better than by presenting examples of best practice? And if we want to do that, how can we do it better than by having panels selecting examples of best practice, recognizing that there will always be some dissention among professionals in these fields about which programs are truly the best?

Mr. Castle. Brevity, please.

Mr. Rutherford. There is no easy way. Panels are needed too, I think . . . they can be government or not . . . to define new practices, see what they are like, raise new possibilities. The business about teacher education is absolutely essential. We learned in the '60s that if you wanted to introduce new programs you needed to do serious preparation.

In those days, NSF ran six-, seven-, and eight-week summer training and academic-year training. And if you ask teachers today who are still in the game what is their favorite science and math teachers, their favorite all-time program, it was that preparation for where they learned new ideas and how to handle new kind of content. You have to do all of these.

Mr. Castle. Dr. Sunley, briefly, please.

Ms. Sunley. Yes. I think one of the things that has been left out of this discussion is the level of field testing that each of these curricula went through before they became commercially available. And one of the purposes of NSF's programs in teacher enhancement and, in particular, in the systemic initiatives is in part to say you shouldn't be undertaking radical education reform without making sure that the teacher

professional development that goes along with it is there behind it.

And so some of the things that one can argue about, whether the programs are tried or untried when they are moved into systems, but all of them have gone through some level of field testing and some level of acceptability by the school districts before they are implemented in the school districts.

Mr. Castle. Thank you.

Dr. Milgram?

Mr. Holt. Thank you. I should give Mr. Petri a moment. I will yield my time.

Mr. Castle. Thank you very much, Mr. Holt. Actually, Mr. McIntosh is the final person.

Mr. McIntosh. Thank you much, Mr. Chairman. I will be quick and brief on these questions.

Professor Milgram, I assume you are familiar with the Saxon math program which is used in many of our districts in Indiana. Is that one of the best or . . .

Mr. Milgram. Well, what is it called?

Mr. McIntosh. They just call it the Saxon math . . .

Mr. Milgram. Oh, Saxon. Okay, yes.

Mr. McIntosh. Is that a good program?

Mr. Milgram. It is said to be. I am not familiar with it. It is . . . the people in Los Angeles are trying very hard to adopt it in Los Angeles right now. People who I know and trust think it is a solid program. I think that there are some programs that I have seen that are different programs but that work very well as well.

Mr. McIntosh. Well, let me share with you that it is a back to basics curriculum, and it has been adopted by about half of the schools in Indiana because of a high success rate. In fact, in one school in Indianapolis the failure rates on our math tests have been quite high. I mean, as high as 70, 75 percent in the Indianapolis school system, went down to just 10 percent.

So my question to you, Dr. McGuire, is has the Education Department been aware of that program, and why wasn't that considered as one of the things that they would be pushing for the schools to adopt?

Mr. McGuire. One thing you have to understand about the way our process works is that we don't get to review it unless it is submitted to us for review. And so I have no doubt but that there might be any number of very good programs out there . . .

Mr. McIntosh. Because of the time shortage, let me ask two questions. Does that mean that Saxon math wasn't submitted?

Mr. McGuire. I can't speak to what was submitted, but not recognized.

Mr. McIntosh. Is your answer that, no, we didn't select it because it wasn't submitted, or, no, it wasn't selected because we didn't like it?

Ms. Rosen. No. The agreement was made when they asked for voluntary submissions that those who were not selected would not be made publicly . . . those names would not be made publicly available.

Mr. McIntosh. Okay. Dr. McGuire I find your answer somewhat duplicitous. You were telling me in this answer why you didn't select it. ``Well, we can't consider them all if they don't submit them.'' If you don't want to release then that, tell me substantively why wasn't it selected?

Mr. McGuire. It is in the law that we operate the panel that way. This is a very interesting . . .

Mr. McIntosh. I don't want to go into your processes right now, although, frankly, I think it is nuts. I think you ought to go out and find good ones as well.

But, second, why wasn't that one that is any good?

Mr. McGuire. I am not in the position to make a judgment about whether that program was good or not, Mr. McIntosh. It wasn't a part of our . . . it wasn't submitted for review. We weren't in a position to pass judgment on it.

Mr. McIntosh. We will follow up on that. I appreciate that.

And thank you, Mr. Chairman.

Mr. Castle. I apologize to both Mr. Holt, who is now getting ready to leave, and Mr. McIntosh, for having to shorten their time a little bit.

And I apologize to all of you. This is sort of like a good book or a good movie; you want it to go on. I would almost like to have this panel back. I didn't get to ask all of my questions either, but you did help us a lot with this subject. It is not easy. I think it does raise some questions that do need some further answering, but we want to thank you for being here. A lot of you have come a long way to be here, and we appreciate all of you.

If there is no further business before the committee, we stand adjourned.

See Appendix L For The Written Statement Of David M. McIntosh, Representative from Indiana.

See Appendix M For Additional Materials Submitted for the record.

[Whereupon, at 12:27 p.m., the subcommittee was adjourned.]

Appendix A-The Written Statement Of Representative Michael N. Castle, Chairman, Subcommittee On Early Childhood, Youth, And Families.

Opening Statement of Chairman Mike Castle (R-DE)

Joint Hearing of the
Subcommittee on Early Childhood, Youth and Families & the
Subcommittee on Post-secondary Education,
Training and Life-long Learning

2175 Rayburn House Office Building
Wednesday, February 2, 2000
10:30 a.m.

Ladies and Gentlemen:

Good morning, and welcome to this Joint Hearing on math education. Chairman McKeon and I are pleased to be joined by our Colleagues from the Subcommittee on Basic Research in Science. Mr. Ehlers serves on both the Science Committee and the Education Committee, as does Congresswoman Woolsey. A high quality math education is critical for all students, especially as the demands of the new age of technology opens before us in this twenty-first century. We have all watched with concern as student math scores remain low in relation to other industrialized nations. According to the 1998 Third

International Mathematics and Science Study, American students rank near the bottom. At the same time, a recent study by the U.S. Department of Education notes, "the single greatest predictor of success in college—not just for engineering and science majors but for all majors—is success in secondary school algebra".

The reason for our hearing today is the endorsement by the U.S.Department of Education last October, of ten math programs supported in part by funding from the National Science Foundation. These programs have been rated as "exemplary or promising" and are designed to meet the 1989 standards developed by the National Council of Teachers of Mathematics.

Subsequent to the endorsement of these programs, a letter signed by more than 200 math and science scholars, was sent to Secretary Riley, asking him to rescind the Department's endorsement of these ten programs. These scholars presented evidence that the endorsed programs followed a common philosophy of math that minimized essential computational

skills and algebra, held to a lower standard than newly adopted California state standards and were not based on sound scientific research before their introduction in thousands of classrooms nationwide.

What has been, and continues to be, a local issue is now muddied by the endorsement of these ten math programs by the U.S.Department of Education. The combination of funding of these systemic math initiatives from the National Science Foundation with the imprimatur of organizations like the National Council of Teachers of Mathematics, places parents and local school districts and even states at a distinct disadvantage if they choose to emphasize a more traditional approach to math education.

We welcome this distinguished panel because we believe you can shed some light on this complicated issue. All of us are interested in raising the current level of math education from near the bottom of the barrel to the top of the heap.

It is my hope that our dialog will result in an improvement in the math skills for students our schools.

I thank the witnesses for taking time from your busy schedules to meet with us today. I look forward to your testimony.

At this time I yield to Chairman McKeon for his statement.

Thank you Chairman McKeon. I now yield to the ranking minority member for any statement he may wish to make.

Appendix B-The Written Statement Of Representative Dale E. Kildee, Ranking Member, Subcommittee On Early Childhood, Youth, And Families.

DEK Remarks
Early Childhood, Youth and Families Subcommittee
Postsecondary Education, Training and Life-Long Learning
Hearing on Mathematics Reform
February 2, 2000

Good morning, I am pleased to join my Postsecondary Education Subcommittee colleague Mr. Martinez, Chairman Castle, and Chairman McKeon at today's hearing on math reform and the appropriate Federal Role.

All of us can agree that our nation's children deserve a top-notch education. Essential in this effort is math instruction that will enable our children to be successful in later life and employment – whether as a mathematician, teacher, doctor, nurse, cook, or even Member of Congress. No matter what their future employment, math skill is a basic essential component of many occupations.

Critical to ensuring that our children receive a quality education is research-tested curriculum coupled with high quality instruction in an environment conducive to learning. All of these variables affect student achievement and while curriculum choices are a critical component, substandard learning environments and unqualified teachers will produce poor student achievement no matter what curriculum is utilized. It is important to keep that in mind as we have this discussion today.

What I believe is needed by many school districts across the nation is guidance on what research shows to increase student achievement. The recommendations of the Department of Education's Mathematics and Science Panel should be one of many tools that school districts utilize in selecting and improving their curriculum. For school districts and states whose standards are aligned with those issued by the National Council of Teachers of Mathematics, the programs designated by the Department may be worth examining. For those whose standards are not aligned with the NCTM standards, the diligent process that we will hear about from Assistant Secretary McGuire and Dr. Rutherford may be useful in shaping curriculum decision making.

Overall, I believe it is critical that school districts have access to research on proven programs. We are at a critical time in American math education. Our nation has not had a good track record of math achievement – as the TIMMS report and other assessments such as the SAT and ACT have demonstrated. What is even more troubling is that math assessment results of women and minorities lag behind their peers. This translates into less women and minorities in careers that require math and science backgrounds. If existing methods have failed to turn this around, we must find a way to reverse this trend by ensuring that school districts have as much information as possible to make their decisions.

Thank you Mr. Chairman.

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Appendix C-The Written Statement Of Representative Howard P. "Buck" Mckeon, Chairman, Subcommittee On Postsecondary Education, Training And Life-Long Learning.

Opening Statement of Chairman McKeon (R-CA)

Joint Hearing of the
Subcommittee on Early Childhood, Youth and Families &
the Subcommittee on Post-secondary Education,
Training and Life-long Learning

2175 Rayburn House Office Building
Wednesday, February 2, 2000
10:30 a.m.

Ladies and Gentlemen:

Good morning, I too want to welcome all those in attendance this morning as we focus on the critical issue of math education in this country.

As a Member from California who has spent considerable time on issues surrounding higher education, teacher quality, and job training programs, I'm well aware of the shortcomings of far too many of our students in the area of math education, and the challenges we face on reversing this trend. A challenge we simply cannot ignore, especially in States such as mine that are critically dependent upon a technology-savvy workforce with a firm grasp of mathematics.

Prof. Milgram, who is here with us today, points out in his prepared testimony that over half of all students attending the California State University System (which admits only the top third of high school graduates) have been required to take remedial math. This is up from 23% in 1989.

Clearly, if there's common ground around this issue, it is the recognition that at the very precise time mathematics is a critical skill, we seem to be doing a worse, not better, job in preparing students in this area.

The efforts of NSF, the Department of Education, and others have been to expand math to more students, in part by making it more 'appetizing.'

Has this been successful? Have there been drawbacks? Is there valid evidence that these approaches have been working? Are these approaches appropriate for wide dissemination and implementation?

I look eagerly forward to having these and many other

questions addressed at this hearing.

I would like to point out that the purpose of this hearing is not to reject reform in mathematics education. Clearly, even in schools that have not instituted math reform, far too many students are falling through the cracks.

Instead, we are here to look at what impact reform efforts have had on student achievement, and what role the Federal government should play.

In this context, we must also remember that reform is not just a matter of a 'silver bullet' curriculum. We must continue to explore the positive impact that parental involvement, high expectations, and highly qualified teachers, have on ensuring that more students perform at higher levels of mathematics.

Again, I thank the witnesses for taking time to discuss this important issue with us today. I look forward to your testimony.

At this time I yield back to Chairman Castle.

Appendix D-The Written Statement Of Representative Matthew G. Martinez, Ranking Member, Subcommittee On Postsecondary Education, Training And Life-Long Learning.

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Remarks of Rep Martinez

GOOD MORNING AND THANK YOU FOR TAKING TIME OUT OF YOUR BUSY SCHEDULES, AND IN SOME CASES, TRAVELING GREAT DISTANCES, TO PARTCIPATE IN THIS JOINT HEARING ON THE APPROPRIATE ROLE OF THE FEDERAL GOVERNMENT IN MATHEMATICS REFORM.

WHEN I WAS A BOY, MORE YEARS AGO THAN I CARE TO ADMIT, I HAD A TERRIBLE TIME WITH MATHEMATICS.

I CONVINCED MYSELF THAT I DID NOT POSSESS THAT MAGICAL ABILITY TO SOLVE COMPLEX EQUATIONS AND SIMPLY GAVE UP TRYING.

IT WASN'T UNTIL A TEACHER TOOK THE TIME TO REACH OUT TO ME THAT I REALIZED THAT MATH WAS NOT MAGIC, BUT RATHER SOMETHING THAT I COULD UNDERSTAND IF I PUT MY MIND TO IT.

BECAUSE I HAD A TEACHER WHO TOOK THE TIME TO WORK WITH ME, I WAS ABLE TO OVERCOME MY FEAR OF MATH, AND EVENTUALLY, IT BECAME ONE OF MY FAVORITE SUBJECTS.

HOWEVER, TODAY, MANY STUDENTS STILL BELIEVE THAT MATH, PARTICULARLY THE MORE ADVANCED COURSES, SUCH AS ALGEBRA, GEOMETRY, AND CALCULUS, REQUIRE SOME MAGICAL ABILITY THEY DO NOT POSSESS.

THIS IS EVIDENCED BY DECLINING TEST SCORES, OUR NATION'S RELATIVELY LOW RANKING IN THE THIRD INTERNATIONAL MATHEMETICS AND SCIENCE STUDY, AND BY THE FACT THAT VERY FEW STUDENTS GO ON TO PURSUE MATHEMATICS IN COLLEGE OR AS A CAREER.

THIS TREND CANNOT CONTINUE IF THIS NATION WISHES TO REMAIN A WORLD LEADER IN THE 21ST CENTURY.

UNLESS WE WANT TO FALL SECOND TO COUNTRIES LIKE JAPAN AND CHINA, WE MUST MAKE THE STUDY OF, AND CAREERS IN MATH, SCIENCE, AND TECHNOLOGY MORE APPEALING TO A BROADER RANGE OF STUDENTS, PARTICULARLY FEMALE AND MINORITY STUDENTS WHO HAVE HISTORICALLY BEEN UNDERREPRESENTED IN THESE FIELDS.

WE MUST ENSURE THAT ALL STUDENTS, WHETHER THEY ATTEND SCHOOL IN NEW YORK CITY, OAK RIDGE, TENNESSEE, LOS ANGELES, CALIFORNIA, OR ANCHORAGE, ALASKA, RECEIVE A HIGH QUALITY MATHEMATICS EDUCATION – ONE THAT INCLUDES THE TRADITIONAL BASIC SKILLS AS WELL AS APPLIED MATHEMATHICS AND PROBLEM SOLVING, AND ONE THAT WILL ALLOW THEM TO PARTICIPATE IN AN INCREASINGLY COMPETITIVE AND TECHNOLOGICALLY-BASED ECONOMY.

THERE IS A GREAT DEBATE GOING ON ABOUT HOW BEST TO REACH THIS LOFTY BUT CRITICAL GOAL.

I EXPECT WE WILL HEAR ABOUT A VARIETY OF STRATEGIES FROM YOU TODAY.

HOWEVER, WHILE I UNDERSTAND THAT THERE IS A GREAT DEAL OF CONTROVERSY SURROUNDING HOW BEST TO GET THERE, I BELIEVE THERE IS ALSO A GREAT DEAL OF CONCENSUS REGARDING WHERE WE WANT TO GO.

I ALSO BELIEVE THAT THE FEDERAL GOVERNMENT CAN PLAY A VALUABLE ROLE IN LEADING US THERE.

ALTHOUGH EDUCATION IS PRIMARILY A STATE AND LOCAL RESPONSIBILITY, THE FEDERAL GOVERNMENT, THROUGH THE DEPARTMENT OF EDUCATION, IS IN A UNIQUE POSITION TO BRING TOGHER A WIDE RANGE OF IDEAS AND CONCEPTS FROM ALL OVER THE COUNTRY AND DISSEMINATE THESE IDEAS AND CONCEPTS TO OTHER PARTS OF THE COUNTRY.

AND THAT IS THE PURPOSE OF THE EXPERT PANEL.

NOT TO DICTATE, BUT TO FACILITATE.

THE EXPERT PANEL ON MATH AND SCIENCE CAN HELP STATES AND SCHOOL DISTRICTS LEARN ABOUT MATH PROGRAMS THAT ARE EFFECTIVELY REACHING STUDENTS IN OTHER AREAS OF THE COUNTRY AND HELP THEM DETERMINE WHICH PROGRAMS WILL BEST ENABLE THEM TO REACH THEIR OWN STUDENTS.

HOWEVER, AS MY COLLEAUGE, CONGRESSMAN KILDEE, POINTED OUT, IT IS IMPORTANT TO REMEMBER THAT THE EXPERT PANEL IS JUST ONE OF MANY TOOLS THAT STATES AND SCHOOL DISTRICTS SHOULD UTILIZE IN CHOOSING CURRICULUM, AND MOREOVER, THAT CURRICULUM IS JUST ONE OF MANY TOOLS IN IMPROVING STUDENT ACHIEVEMENT.

AS MY OWN EXPERICE DEMONSTRATES, QUALIFIED TEACHERS AND INDIVIDUAL ATTENTION ARE ALSO ESSENTIAL TO MASTERING COMPLEX SUBJECTS SUCH AS MATHEMATICS, SCIENCE, AND TECHNOLOGY.

THERE IS OBVIOUSLY NO SINGLE WAY, NO SINGLE PROGRAM, THAT WILL DEMYSTIFY AND MAKE MATH ENGAGING TO ALL STUDENTS.

INDEED, EVERY CHILD LEARNS DIFFERENTLY AND A SINGLE TEACHER MAY NEED TO EMPLOY A NUMBER OF TOOLS TO REACH ALL OF HIS OR HER STUDENTS.

THEREFORE, IT IS THE RESPONSBILITY OF THE FEDERAL GOVERNMENT TO ENSURE THAT A WIDE VARIETY OF TOOLS EXISTS AND ARE EASLITY ACCESSIBLE.

Appendix E-The Written Statement Of Judith S. Sunley, Interim Director, Office Of Education And Human Resources, National Science Foundation, Arlington, Virginia.

DRAFT Testimony
02/01/00

COMMITTEE ON EDUCATION AND THE WORKFORCE
U.S. HOUSE OF REPRESENTATIVES

SUBCOMMITTEES ON
Early Childhood, Youth, and Families
AND
Postsecondary Education, Training, and Life-Long Learning

HEARING ON
Federal Role in K-12 Mathematics Reform

February 2, 2000

TESTIMONY
OF THE
NATIONAL SCIENCE FOUNDATION

Judith S. Sunley
Assistant Director (Interim)
Education and Human Resources

Mr. Chairman and Members of the Subcommittees:

Thank you for the opportunity to contribute to your deliberations on the appropriate federal role in K-12 mathematics education reform. This hearing provides an opportunity to describe the National Science Foundation's K-12 math and science education programs to a new audience. We appreciate the Committee's interest in understanding how our programs fit into the overall context of local, state and federal activities.

NSF in K-12 Mathematics and Science Education

NSF's definition of its role in K-12 math and science education and the resulting programs grow out of NSF's role as a federal agency whose mission is to promote the progress of science and engineering. Education in science, mathematics, engineering, and technology has been part of our mandate since NSF's inception. We have programs of formal education in these areas at all levels, and we support informal education activities as well.

In carrying out this mandate, we have two connected objectives in mind:

(1) Developing a strong, diverse, globally-oriented workforce of scientists and engineers to maintain the nation's progress in science and engineering well into the future; and
(2) Enabling a citizenry that understands and can take full advantage of basic concepts and skills in science, math, and technology.

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NSF's objectives are quite broad, while NSF itself is small – even in the context of federal spending on education. So we have asked what NSF can and should do in working toward those objectives, both generally and in K-12 math and science. Answering the latter question gets at both the role of a federal agency in an area where local and state levels of government dominate decision making and the appropriate niche for NSF among federal agencies.

The key concepts underlying all NSF's strategic thinking were critical in shaping the current portfolio of K-12 math and science education programs. These include working on the frontiers of knowledge, expanding the boundaries of our understanding, and developing new approaches, models, and tools that will stimulate progress. We serve as a catalyst, enabling others to conduct research and education activities at the cutting edge, supporting the work of the most creative individuals and groups.

At the same time, NSF constantly explores the current state of knowledge and activity in science and engineering research and education, facilitating the emergence of new ideas and approaches. This is particularly important in K-12 education. While we do not play a major role in decision-making, NSF serves as a facilitator, both assisting in the development of new ideas and approaches and providing resources to enable those who wish to implement them to get started.

NSF also provide links into the science and math communities, bringing their expertise to bear on issues of content. Indeed, this is something that NSF must do. Our strengths lie in our connections with the scientific communities with which we work and with the higher education institutions where most of them are located. NSF's activities in K-12 math and science education must build on these strengths if they are to have impact.

With these basic principles in mind – operating at the frontiers, facilitating new ideas and approaches in both their development and implementation, linking to the science and math communities, and connecting K-12 and higher education – the rationale for NSF's K-12 math and science education programming is set. The actualization in programs depends on circumstances that change over time, requiring a dynamic approach to developing, implementing, and evaluating programs.

Two aspects of K-12 education activity have been part of NSF's programming through most of its history – development of curricula and instructional materials, and teacher professional development, both in-service and pre-service. This is natural, as it is in these content-rich activities that connections to both the math and science communities and higher education are most direct. Ideally, these activities should be carried out by a partnership of those who understand deeply the scientific content and those who understand the pedagogical issues involved in conveying the content to learners.

The character of NSF programming in these areas shifts over time as our understanding of the current state of math and science education and the research base informing that assessment dictate. Math and science education reform have similar stages, although the timing of key events is somewhat different. For the remainder of this testimony, I will focus on math education.

Standards for K-12 Mathematics

The most significant shifts in the character of NSF programming for K-12 math education have their roots in the 1980's. Four key elements stimulated these shifts.

First, K-12 mathematics was failing large portions of our student population, something we had known for a very long time, but did not confront. Next, uses of mathematics in the working world and in the daily decisions of our lives were changing significantly, making it important to have a much broader range of the population with a much stronger background in mathematics. The imagery that arose in the math community was to see math education as a "pump" leading students into the mathematics necessary for high quality jobs, rather than in its traditional role as a "filter" allowing only the best students to have access to opportunities for advancement.

The changing role of mathematics also meant students needed to learn new concepts such as discrete mathematics, data analysis, and elementary statistics and probability, not part of the standard K-12 math program. New elements needed to be added to an already packed curriculum.

Finally, new capabilities arising from advances in information technologies put a high premium on knowing what mathematical operations to perform when and being able to estimate what the answer should be. However, studies showed students' inability to deal with complex, multi-step problems drawn from realistic or not-so-realistic situations to be one of the key shortcomings in math achievement. The community with interests at the interface of mathematics and education needed to consider how to reconcile these conflicting ideas.

At the same time, events like the summit on education involving President Bush and the nation's governors placed pressure on schools and educators to show dramatic improvement in mathematics achievement. Discussions of standards and mechanisms for attaining improved performance dominated the scene.

All these issues and more set up a situation where choices had to be made and human judgment exerted. With this swirl of ideas as backdrop, the National Council of Teachers of Mathematics – NCTM is the largest of the mathematics-related professional societies, with a membership of over 100,000 – developed a set of standards for K-12 math education. They reached inward to their membership and outward to the mathematics and education communities broadly for ideas, discussion, and criticism.

Perhaps the key decision underlying the standards was to focus on areas that would impact the broad student population. Combining this with research suggesting that optimal learning patterns are different for different individuals, NCTM recognized that increasing achievement for all students required that teachers use a broad range of teaching modes. Between addressing instructional practice in substantive ways and adding new elements to the curriculum, the developing NCTM standards introduced many new ideas to K-12 math education, ideas that carried promise for improving achievement, but that might be difficult to implement.

After broad consultation with all stakeholders – including the mathematicians – NCTM published their standards in 1989, creating a starting point for discussion and action. When we speak of national math standards, it is the NCTM standards, developed

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through a national organization of people who work at the interface of mathematics and education in consultation with other interested parties, that we mean.

Development of Instructional Materials

NSF's programming in K-12 math education shifted to accommodate the existence of the NCTM standards. The initial changes were two-fold.

First, existing curricula and the textbooks and other instructional materials that implemented them were not consistent with the NCTM standards. They reflected the "filter" mentality, rather than priming the "pump" as NCTM felt math education should do. Thus, new instructional materials were needed, particularly comprehensive, multi-year programs of work that would implement the core ideas of the standards. Such curricular development is extremely expensive, not likely to be undertaken by textbook publishers absent some evidence, usually provided by field tests of the materials, that school systems might be willing to adopt them.

NSF's programs stepped up to that challenge, providing partial support for the development of 13 multi-year curricula, including six of the ten recently identified by the Department of Education's Expert Panel as exemplary or promising. Initial awards were made in 1990, with most of the materials reaching commercial status in the 1997-98 timeframe. Development of the curricula was informed by the available research base on learning and teaching. Field tests of the materials were positive, and, while there has been controversy surrounding some aspects of their implementation in schools, they are being adopted in a wide variety of settings. We are now beginning to see evidence that their use improves overall student achievement, providing enhanced performance in areas of complex problem solving while enhancing or maintaining performance in basic skill areas. Many of these curricula are now undergoing revision to incorporate what the developers have learned through implementation of these curricula in varied types of schools.

Since many of these curricula place new demands on teachers, NSF has also seen some shifts in the teacher professional development activities. Many projects currently underway link enhancing content knowledge of teachers to the types of mathematics they will be teaching, addressing content knowledge, research base, and pedagogical issues simultaneously.

Systemic Approaches

Following issuance of the NCTM standards for K-12 mathematics, many states were interested in how to adapt them to their own use. They also recognized that it was not sufficient simply to adopt standards. They would need to address the impact of the standards on state curriculum frameworks and assessments, and they would need to provide leadership and guidance to local districts on curricular issues, teacher professional development, and related matters. Many had few people with appropriate content backgrounds to address the full set of activities needed for implementing math standards (or to develop the parallel standards and implementation for science). This brought NSF into a new facilitative role – one that linked our work with curricula and teacher professional development into a focus on how all the pieces of K-12 mathematics and science education fit into the broader educational system.

The result was a new program in FY 1991, the Statewide Systemic Initiative (SSI) program. Over three years, a total of 25 states and the Commonwealth of Puerto Rico received funding for addressing standards, content frameworks, implementation planning, and teacher professional development in science and math. The Montana SSI was also involved in developing curricula for mathematics. A second phase still underway funds seven states and Puerto Rico to intensify their implementation efforts and to provide opportunities for networking and discussion of effective mechanisms for education reform. Total funding from FY 1991 through FY 1999 is approximately $310 million.

Through experience with the SSIs, NSF found many districts embracing the idea of bringing the elements of K-12 math and science education systematically into a more synergistic whole. New elements were added to NSF systemic reform programming beginning in FY 1994 with the Urban Systemic Initiatives (USIs) and in FY 1995 with the Rural Systemic Initiatives (RSIs). The focus in both these initiatives was addressing the concerns of school systems with large fractions of their children living in poverty, where need for education reform was strongest as achievement was very low. Disparities in performance for students living in poverty compared with those in economically strong households were and are large. School systems with large numbers of such students were struggling to maintain even their existing levels of achievement.

Through the systemic initiative programs, states and districts meeting appropriate criteria that wished to move toward reform efforts could apply to NSF for funds either to plan such efforts or to support in part their implementation. The proposers provided NSF with a plan for the activities they would carry out, usually involving implementation of new curricula and teacher professional development in line with national, state, and/or local standards. Where appropriate, the plan would discuss how the district(s) would bring the local community into planning for implementation of the initiative. It might also discuss the interaction with relevant higher education institutions or how the system will incorporate the evolving body of research on math and science education. External experts in the interface of math and science with education reviewed the proposed plans as the basis for a decision on funding.

SSIs cover activities throughout the state. Most of the USIs involve a single district, while the RSIs involve consortia of districts, some crossing state boundaries. Proposals from a single district were and are expected to come from either the superintendent of schools or a chief academic officer in the district. Some awards were made to higher education institutions that manage them for the consortia.

The participating states and districts know from the inception that NSF funds will not support the full effort at implementation of math and science education reform. They describe in the proposal how they will use relevant funds from local, state, or national sources in carrying out their plan. The largest costs are usually for coordinating the implementation of instructional materials – sometimes identified in the proposal, other times not – with teacher professional development. (Note that in the earliest stages of the systemic initiatives, materials developed through NSF's instructional materials development activities were not yet commercially available. Districts generally used existing materials and adapted them to standards-based instruction. In recent years, many, using their existing selection processes to identify materials consistent with their plan for implementing standards-based education reform, have adopted materials developed in part with NSF funds.)

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The awardees are also aware that there are no guarantees that, even if funded, they will be entirely successful in carrying out their reform plan. Implementation of educational reform has an inherently experimental component, as it is impossible to duplicate precisely the conditions under which an implementation may have been successful at other times or in other locations. Nonetheless, NSF and our grantees have learned a good deal about what goes into successful systemic reform efforts in math and science, and we provide this information to those choosing to embark on such ventures.

Systemic initiative awards are made as cooperative agreements, a funding mechanism that provides for accountability in carrying out the project. The awardees commit to providing an agreed-upon set of data that they will use to demonstrate progress in meeting their plan relative to starting baselines. Four states and four urban areas had their NSF funds withdrawn before completion of the project due to lack of progress.

The systemic initiative programs have not remained static. As noted above, the SSI program has moved to a second phase. The initial USI program focused on the largest districts with significant fractions of students living in poverty. NSF just formed the Urban Systemic Program (USP) out of the USI and the Comprehensive Partnerships for Mathematics and Science Achievement, a program aimed at smaller urban areas. We have discovered that RSIs containing too large a number of districts are unwieldy, so we are adapting the eligibility criteria for that program. In their initial forms, the USI program supported 23 cities for a total of $288 million from FY 1994 through FY 1999. The RSI program supported 7 consortia at a total of about $42 million from FY 1995 through FY 1999.

In each of the systemic activities, NSF encourages awardees to involve all those who influence what happens in the schools. We invite connections with the math, science, and engineering communities, acting as a conduit, where appropriate. Different districts have had varying levels of success in maintaining these connections, and their ability to maintain them has influenced their overall success.

As more of the systemic initiatives incorporate attention to teacher recruitment in their plans, connections to higher education institutions are more substantive. Another factor affecting connections to higher education is the increasing amount of research being done in the context of the systemic initiatives. At the same time the systemic initiatives try to incorporate the most current research in math and science education into their implementation plans, they provide a rich context for educational research. The scale of their implementation activities is difficult to match in something that is simply a research project.

The systemic initiatives have also had an impact on NSF's more traditional programs of teacher professional development. While many districts were not prepared to undertake broad reform in K-12 math and science education, they did wish to address more targeted areas where change was needed. They focused on the importance of intensive professional development for teachers in meeting the requirements for change. Thus was born the Local Systemic Change (LSC) option in NSF's Teacher Enhancement program.

This option allows districts (or consortia) to propose activities that focus on math or science reform in a grade-band, with an emphasis on professional development. The

external evaluator (Horizon Research, Inc.) of the LSC projects recently reported "that the combination of LSC professional development and use of exemplary instructional materials appears to have the greatest positive impact on the quality of classroom instruction." In its fourth year of implementation, LSC involves 59 projects, reaching 53,000 teachers in nearly 3,000 schools in 327 districts across the nation.

Other NSF Programs Affecting K-12 Math and Science Education

The focus of this testimony has been on activities that seem to contribute most directly to the subject of the hearing. However, NSF has a number of other programs that have an impact on K-12 education. They merit mention as well.

Research in math and science education has long been part of NSF's portfolio of activities. In recent years, our efforts in this area have expanded, and there is new emphasis on understanding what influences student learning and how that understanding can be addressed in educational settings. A new program in partnership with the Department of Education and the National Institute for Child Health and Human Development, the Interagency Education Research Initiative, shows particular promise for bringing rigorous methodology and interdisciplinary approaches to the challenges of large-scale educational research.

One research-oriented area where NSF has had strong activity is the adaptation of information technologies for use in education. This area has the potential to change our educational processes significantly, but there are many challenges in balancing the opportunities with possible drawbacks.

One use of information technology in education is making sure that information gets to those who can use it most effectively, be they teachers, principals, district administrators, or students and their parents. NSF is currently developing a National Science, Mathematics, Engineering and Technology Education Digital Library that will provide access to carefully vetted, high-quality information for all these groups. We envision the possibility of interactive programs that will provide a whole new level of opportunity for isolated schools.

Programs preparing future teachers also have a significant impact on K-12 math and science education. NSF's teacher preparation activities are based on the premise that math and science content specialists must play a strong role in educating future teachers. They involve cooperative activities between math, science, and engineering departments, schools of education, and, where feasible, local school systems.

Centers for Learning and Teaching provide a means of linking K-12 and higher education by addressing the continuum from pre-service teacher preparation through continuing in-service professional development. They will bring the latest research on learning processes and use of technologies together with enhanced content knowledge to develop teaching professionals that can continually adapt their practices to the situations they face in the classroom. NSF plans to fund two or three prototype centers in FY 2000, with expanded activity in the future.

Another recent effort to link higher education with K-12 schools is NSF's program for Graduate Teaching Fellows in K-12 Education, generally known as GK-12. This effort provides opportunities for graduate students in math, science, and engineering to serve

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as content resources for teachers and students in the classroom. It also provides the graduate students with an opportunity to gain new understanding of what it means to teach their subjects effectively.

Informal education activities are tied in many ways to what goes on in classrooms. Teachers may bring their classes to view museum exhibits, many of which have special materials developed for use in classroom units. Similarly, exposure to concepts of math and science through the media enhance student interest and knowledge, carrying over into their performance in the classroom. After school activities can expand on what the teacher does in class during the school day.

The current form of all these NSF activities is still influenced by the defining events of the late 1980's, particularly the development by the National Council of Teachers of Mathematics of their K-12 standards for math education. These standards, arising from a community of practitioners and experts, provided new ideas and approaches that have been embraced by many.

More than 10 years after the issuance of the standards, we see their impact in their adaptation at state and local levels and in the development of standards-based curricula that are now being implemented in classrooms. And, of course, that is where the rubber meets the road. People of good will have many different opinions as to the effectiveness of those implementations. Neither standards, curricula, or implementations have been flawless.

NCTM is currently updating and revising the standards, with the new version due out later this year. In the process of revision, they have shared drafts with all who are interested in contributing to the effort, and created a true community of stakeholders who, although they may not agree on all aspects of recommendations for K-12 math education, are talking with and listening to one another.

NSF is an interested bystander in this process. Once it is complete, we will look to the communities with which we work for guidance on how to shape NSF programs to address the issues it has raised. I personally look forward to this. Mathematics education is and should be a dynamic process that takes many influences into account. We cannot afford to let it be static. Nor can we afford to let our areas of disagreement mask the fact that there is much agreement among all affected parties as to the importance of math education for our youth and as to the core knowledge base they will need.

NSF's efforts in math education reform have led us to partner with the Department of Education so that our activities were complementary and so that we could help in developing needed dialogue among the mathematics and education communities. Constructive dialogue is critical to pulling divergent ideas and opinions into a range of productive activities that can influence student achievement for the better.

NSF contributes to this dialogue by providing information on the results of its portfolio of projects, by sharing the models developed through those projects, and by bringing diverse communities together. These contributions, in conjunction with focused support for education reform activities that permit trying out new approaches, keeps the agency true to its mission – promoting the progress of science and engineering – as we keep our eyes and ears open for the ideas and opportunities that new knowledge provides.

Appendix F-The Written Statement Of Kent McGuire, Assistant Secretary, Office Of Education Research And Improvement, U.S. Department Of Education, Washington, DC.

Prepared Testimony of

Assistant Secretary C. Kent McGuire
U.S. Department of Education

Before the

Subcommittee on Early Childhood, Youth and Families
and
Subcommittee on Postsecondary Education, Training and Life-Long Learning

Mr. Chair and Members of the Subcommittees:

Thank you for inviting me to appear before you today. I welcome the opportunity to talk about the many initiatives that the U.S. Department has underway in support of higher student achievement in mathematics and to answer questions that I know you have with regard to the Mathematics Expert Panel review process.

Although mathematics has long been a critical component of every child's education, its importance will increase significantly in this new century certain to be dominated by math, science, and technology. Unfortunately, student achievement in mathematics has not kept pace with this growing dominance.

There are hopeful signs. Mathematics scores from the National Assessment of Educational Progress (NAEP) increased significantly at grades 4, 8 and 12 between 1990 and 1996, with gains equal to at least one grade level. Several states, including Connecticut, Michigan, North Carolina and Texas, are reporting significant gains in mathematics scores. During the past two decades, high school students are taking more years of mathematics, more students are taking advanced placement mathematics courses, and average SAT scores have risen from 500 in 1991 to 512 in 1998, even as the number and diversity of test-takers have increased.

Nonetheless, results on the Third International Mathematics and Science Study (TIMSS), administered in 1995, indicate that the U.S. still has progress to make before our students have a world-class mathematics education. The fourth grade mathematics results show U.S. students perform above the international average. The eighth grade mathematics results show lackluster performance by U.S. students, with scores slightly below the international average. Most disappointing, the mathematics results at the end of secondary school show American twelfth grade students among the lowest tier of the 21 participating countries. It is important to note that younger students, whose formal education has occurred since the beginning of standards-based reform, are competing more effectively against their international peers than older students whose early academic work occurred before those reforms.

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Recognizing that far too many students finish high school without mastering the mathematics necessary for success in higher education and in our competitive knowledge-based economy, the Administration sought proactive ways to implement reforms in support of higher student achievement in math.

PRESIDENTIAL DIRECTIVE

On March 6, 1997, President Clinton issued a memorandum directing the Secretary of Education and the Director of the National Science Foundation to form an interagency working group. The group was challenged to develop an action strategy that would use Federal resources to assist States and local school systems in preparing students to meet high mathematics standards in eighth grade. The request was motivated, in part, by the TIMSS results, which demonstrated a clear need to focus on improving mathematics achievement in grades 5-8.

In February 1998, the interagency group transmitted its report, "An Action Strategy for Improving Achievement in Mathematics and Science," to President Clinton. It focused most prominently on the improvement of middle school (grades 5-8) mathematics, but also addressed broader needs in elementary and secondary mathematics and science education.

To prepare the report, the interagency group reviewed the current state of mathematics education, consulted with other Federal agencies and with various academic and professional organizations, and reviewed Federal programs before identifying three priority areas for action. The three areas—upgrading teaching, improving curriculum and instructional materials, and building parent and public awareness and engagement—were seen as those in which Federal investments could achieve maximum leverage and impact. These are also areas in which Federal investments would respect and support State and local autonomy, such as:

- Assisting States, local school districts, and the Nation's colleges and universities to provide the skills and knowledge that equip teachers to teach challenging mathematics content in effective ways, with high expectations for all students;
- Assisting States and local school districts to select and implement high-quality, standards-based curricula and instructional materials, including making effective use of educational technologies; and
- Building public support for the need for challenging mathematics, especially in grades 5-8, and gaining public support for raising student achievement toward high standards.

Appropriate projects were outlined in each area, and Federal agencies were asked to incorporate priorities for work in middle-school mathematics among the selection criteria used for grants, and to enhance the level of technical assistance provided to State and local educational agencies.

With the majority of Federal resources for improvement in K-12 mathematics and science education flowing from the Department of Education and the National Science Foundation, the two agencies began work on a set of joint activities proposed in the action strategy, which included a national convocation on middle school mathematics; coordinated research activities;

and a public engagement campaign. It also included implementation of Section 941(d) of Public Law 103-227, which directed the Department to identify promising and exemplary programs.

AMERICA COUNTS

In the same time frame, Secretary Riley and senior Department officials developed seven priorities for the Department, based on a "Call to Action," issued by the President in his 1997 State of the Union Address. One of these seven priorities stated that "All students will master challenging mathematics, including the foundations of algebra and geometry, by the end of eighth grade." The President's Directive and this Secretarial priority dovetailed and led to the establishment of "America Counts," a cross-department initiative that stimulates new projects, coordinates work between related projects, and disseminates information across projects related to improving student achievement in mathematics. Formula and competitive grants related to mathematics education fall under the umbrella of "America Counts." Several recommendations in the action strategy, particularly the joint activities with the National Science Foundation described above, were undertaken as the initial "America Counts" efforts.

Currently, there are six key strategies underpinning "America Counts." They are:

- Equip teachers to teach challenging mathematics through high quality preparation and ongoing professional growth;
- Provide personal attention and additional learning time for students;
- Support high quality research to inform best practices of mathematics teaching and learning;
- Build public understanding of the mathematics today's students must master;
- Encourage a challenging and engaging curriculum for all students based on rigorous standards; and
- Promote the coordinated and effective use of Federal, State, and local resources.

Progress in any one of the six strategic areas will often depend on and demand improvement in others. For instance, the introduction of high-quality instructional materials will have little impact if teachers are not trained to use those materials effectively. And, progress will often depend on State and local actions such as the selection of high-quality curriculum materials for math and science classrooms. Progress in any of the six strategic areas will also often depend on using existing resources in new ways. For instance, Secretary Riley issued a waiver, effective July 1, 1999, to existing regulations, allowing the Federal Government to pay the full wages of eligible Federal Work-Study students who serve as mathematics tutors to elementary through ninth grade students.

Several publications and other print or electronic resources are now available, several others are at differing stages of development through various projects. Technical assistance is available through the Eisenhower Mathematics and Science Consortia and other centers nationwide (such as the ten regional laboratories) that are supported by the Department. [See http://www.ed.gov/americacounts/sixgoals.html for detailed information on "America Counts" projects.]

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The Federal Role

While education is a national priority, the Department understands that it is primarily a State and local responsibility. The Secretary and I believe that the Federal role is to provide good information, effective tools, and financial support that will assist States and local communities in ensuring that all of their students have the mathematical skills they need to succeed in the workplace as productive citizens. This includes promoting effective partnerships that mobilize support from the community—students, parents, educators, business leaders, volunteers, and concerned citizens from all walks of life—to that end. The efforts in "America Counts" reflect this philosophy.

The Importance of Rigorous Standards

States, districts, and national organizations have all supported the development of standards for benchmarking the performance of all students. The National Council of Teachers of Mathematics (NCTM) was one of the first national organizations to develop sets of standards for content, teaching, and assessment. The National Research Council (NRC) developed a comparable framework for science standards.

State and local education agencies have worked to develop standards and approaches suitable to their circumstances, drawing as they find appropriate on frameworks established by national organizations such as NCTM and the NRC. Indeed, 43 states have revised their state curriculum frameworks over the last decade to be consonant with the NCTM *Standards* and the American Association for the Advancement of Science (AAAS) *Benchmarks*.

Another source of input to deliberations on standards is found in the content of TIMSS and the National Assessment of Educational Progress (NAEP). Managed by the independent National Assessment Governing Board, the content of the NAEP assessments reflects a collective judgment of State and local educational officials, content experts, and the broad community of concerned citizens about what our children should know and be able to do in many fields. In mathematics and science, there is an alignment between the NAEP framework and the NCTM and NRC standards, as well as State and local standards now being implemented across the country.

Each "America Counts" endeavor incorporates this standards-based view of mathematics and science education. One of particular interest in this hearing is the Mathematics and Science Expert Panel, an effort to "Encourage a Challenging and Engaging Curriculum for all Students."

THE MATHEMATICS AND SCIENCE EXPERT PANEL

The Department of Education and its predecessor, the U.S. Office of Education within the Department of Health, Education and Welfare, have a long history of supporting panel processes for the purpose of reviewing replicable programs. Most features of the review panels have evolved over time in response to Federal funding for development, the level of innovation in the field, the state of the art of program evaluation, and Federal panel leaders. The present Mathematics and Science Expert Panel is part of this evolutionary process and incorporates what

has been learned along the way. I am certain that this Panel will significantly add to our growing understanding about such reviews.

With the passage of the 1994 reauthorization of the Office of Educational Research and Improvement (OERI), Congress directed the Department to establish "panels of appropriate qualified experts and practitioners" to evaluate education programs and recommend to the Secretary of Education those programs that should be designated as exemplary or promising. The purpose of these panels was to provide teachers, administrators, policymakers, and parents with information on the quality and effectiveness of programs and materials so that they can make better-informed decisions in their efforts to improve the quality of student learning.

Many individuals and organizations were involved in planning the System of Expert Panels emerging from the 1994 reauthorization. The OERI National Educational Research Policy and Priorities Board commissioned papers from a variety of individuals to examine all aspects of review panels, ranging far beyond the experiences of the Department of Education. This Board approved both the 1996 proposed rules and the 1997 final rules for the System of Expert Panels. The OERI Office of Reform Assistance and Dissemination developed conceptual and planning papers, established a listserv to help individuals share information and advice about the system, and provided staff and contractor support for four expert panels (Gender Equity; Mathematics and Science; Safe, Disciplined, and Drug-free Schools; and Technology).

Membership

The Expert Panel on Mathematics and Science Education was established to develop and oversee a valid and reliable process for identifying and designating exemplary and promising programs. OERI assembled a panel of 15 members, composed of educators, scientists, mathematicians, and policymakers with extensive experience in mathematics and science education. My predecessor, Assistant Secretary Sharon Robinson, selected the members in July 1996, and charged them with the task of evaluating materials and recommending to the Secretary those that should be designated exemplary or promising. The intent is to repeat the process at regular intervals so that the list of designated materials expands.

In the first year of operation, 1998, the Expert Panel reviewed 61 different K-12 mathematics programs that were voluntarily submitted to the panel by January 30, 1998. From their review, the panel identified five programs as exemplary and five as promising. At the Department's October meeting on "Improving America's Schools," I announced the results and the electronic and hard copy availability of a publication, *Exemplary and Promising Mathematics Programs*.

In the weeks that followed, many responses were sent to the Department, some expressing support for the Panel's process, some expressing concern. Each of these letters has, or will be, responded to shortly. Let me characterize the nature of the Department's responses to date.

- We agreed that additional representation of research mathematicians with substantive knowledge of K-12 mathematics education would strengthen panel deliberations. However, we do not feel the results of the Panel that was assembled were undermined in any way.

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- We expressed concern that the "math wars" seem to be continuing. And, we have asked both sides to work collaboratively on areas of disagreement after identifying the many areas of agreement.
- We reaffirmed the Department's deep commitment to a mathematics education for all students that requires the acquisition of traditional basic skills (including addition, subtraction, multiplication, and division) and of the basics of a new information age (communicating mathematical ideas, applying mathematics in real-world settings, and problem solving).

Panel Criteria

Before the Expert Panel developed criteria for its review, they assessed the landscape of mathematics education nationwide. They found that 43 states had adopted or substantially incorporated the recommendations of the NCTM and the AAAS into their own state frameworks. Recognizing the importance of local decision-making about curriculum materials, the Panel thus decided to base its criteria on the NCTM *Standards* and AAAS *Benchmarks*.

The Expert Panel established four categories of criteria in making their judgment about which programs were "exemplary or "promising." These four categories were field tested in 1997 with teachers and researchers, including research mathematicians. The categories are quality, usefulness to others, educational significance, and evidence of effectiveness and success.

"Quality" refers to the appropriateness of the program's learning goals for the intended student population and the alignment of content with those goals. "Usefulness to others" refers to adaptability of the materials to diverse educational settings. "Educational significance" refers to the consonance of the programs with the visions promoted in national standards, as described earlier.

Most important among these categories is evidence of effectiveness and success. Exemplary programs had to demonstrate higher student achievement in multiple sites with multiple populations; promising programs had to demonstrate higher student achievement in at least one site. [Programs designated as promising may choose to resubmit in subsequent reviews as additional student achievement data is gathered.]

The Panel Process

The panel created a three-tier system to evaluate each of the submitted programs.

- Field based teams: Almost 100 teachers, researchers, and practitioners in mathematics were trained for three days to help with the initial review process. The training was planned by the Panel in consultation with organizations that had undertaken similar reviews. Each program submitted was reviewed by two different field based teams (each team consisted of two people).
- Program Evaluation: In the second step, programs with high ratings were then reviewed by program evaluation experts who assessed the quality of the evaluation data and the claims of effectiveness made by the developers.

- **Full Expert Panel**: The full expert panel then reviewed all of the programs along with the ratings and comments of the review teams to determine which to recommend to the Secretary.

Efforts are underway to make those in the field aware of the Panel's recommendations, in full recognition that the decision to use any of these exemplary or promising mathematics programs is left entirely to local school districts. Both the Secretary and I hope that the Panel's work provides a helpful starting point for districts as they select new curriculum materials.

Summary

A solid foundation in mathematics and science is increasingly necessary to navigate this changing technological and information age. The Department of Education, with its links to State and local education agencies and community groups, has taken—and will continue to take—significant steps in support of an excellent mathematics education for every American child. We owe the next generation no less.

Thank you very much. I welcome your questions about the Department's efforts through its "America Counts" initiative.

Appendix G-The Written Statement Of James Milgram, Professor Of Mathematics, Stanford University, Stamford, California.

Written Testimony of R. James Milgram
February 2, 2000

I am honored to be here today and to be able to share my observations on the state of mathematics education in this country with the distinguished members of the Committee on Education and the Workforce.

The K - 12 teachers in this country are dedicated professionals, deeply committed to teaching our children. They persevere in the face of difficult conditions and low pay. I have the utmost respect for them. But all too often, their knowledge of mathematics is extremely superficial, and when this happens they are easily swayed by trendy and unproven programs which typically offer a superficial treatment of the subject, leading to weak backgrounds in their students.

Perhaps a local parent described this situation best when she wrote me recently that the curriculum was getting fuzzier and fuzzier, and she "concluded that by and large most teachers support it because it makes them feel OK about math - they understand language, not symbols." She continues, "I cannot tell you how many times I have heard from administrators and teachers, how, if they had had "this" math when they were in school, perhaps they, too, would have been perceived as a 'math person'."

I am a research mathematician, and research in esoteric areas of mathematics

is essentially all I did besides teaching graduate and undergraduate classes in mathematics at Stanford until four years ago.

Two things obligated me to spend much of my time for the last three years studying issues related to K - 12 mathematics.

The first was some courses I gave in New Mexico, where I had too many bright, very highly motivated students in my mathematics classes whose third rate K - 12 educations in mathematics could not be overcome no matter how hard these students were willing to work.

The second came from the Presidential Commission designing Clinton's proposed national eighth grade mathematics exam. The commission - including many of the foremost math education specialists in the country - distributed a list of 14 proposed problems. I and my colleagues at Stanford were amazed to find that 3 of the problems had serious errors. One was so ill posed that it could not be solved. One had an incorrect solution included with it.

We later testified to the Clinton commission about these difficulties, and it became clear that the level of mathematical understanding on the part of the mathematics educators on this panel was unimpressive.

There is a distinction between math educators who are primarily interested in

questions involving education, and mathematicians who know about mathematics. While educational issues are unquestionably important there has been a tendency recently to focus on educational questions at the expense of mathematics content.

I was disturbed when I realized that it is these people who are determining the mathematics that our children learn in school. I was especially disturbed in view of the dramatic drop in content knowledge that we have been seeing in the students coming to the universities in recent years.

Since 1989 the percentage of entering students in the California State University System - the largest state system in the country - that were required to take remedial courses in mathematics have increased almost 2 1/2 times from 23% in 1989 to 55% today. And CSU admission is restricted to the top 30% of California high school graduates!

This failure has important consequences for the nation. Although large numbers of US students entering the universities say they are interested in majoring in technical areas, very few actually get such degrees today.

The total number of technical degrees awarded to US citizens recently is approximately 28,000 yearly, while there are currently about 100,000 new jobs in these areas each year. Last year congress had to mandate an additional 142,000 new work visas for technically trained people, and these visas were

used up by June 11, 1999, so great was the demand.

A large part of the blame rests with mathematics programs of the type recommended by the Department of Education recently as exemplary or promising.

All but possibly one of the programs in the list recommended by the Department of Education, represent a single point of view towards teaching mathematics, the constructivist philosophy that the teacher is simply a facilitator. Standard algorithms for operations like multiplication and division are not taught, but students are advised to construct their own algorithms. At all stages hand held calculators are used for arithmetic calculations. There are no means for students to develop mastery of basic arithmetic operations. Algebra is short-changed as well.

These programs all are designed to closely align with the 1989 NCTM Mathematics Standards: standards which explicitly embody all the principles above, and specifically require that skills in algebra be downplayed. Indeed, the co-chairman of the Department of Education Expert Panel on Mathematics, Steven Leinwand, recently stated that the curricula endorsed by the Department of Education "create a common core of math that all students can master." Not material that all students NEED to know or SHOULD master, simply material that HE believes all students

can learn. (Incidently, Department of Education statistical analysis - C. Adelman, 1999 - show that success in algebra in high school is the single most important predictor of degree attainment in college.)

The high school programs, Core-Plus and IMP, both place heavy emphasis on topics such as discrete mathematics at the expense of basic algebra, and do not come near the level indicated in e.g., the new California Standards for most of the topics there.

However, programs such as these are completely consistent with the previous California Mathematics Standards. Consequently, at least three of them, CPM, Mathland and IMP, have been in wide use in California for up to 10 or more years. (MathLand and IMP were developed in the late 1980s at the same time that the 1989 NCTM Standards were being developed, and were introduced into California Schools by 1989.)

Recent studies of the SAT mathematics scores of high schools which use IMP showed a consistent and significant decline over the last ten years. Moreover, high schools that use IMP in California scored below the state means, and those that expressed satisfaction with the program scored, on average, 10 points lower than those which were dropping the program or otherwise were dissatisfied with it.

It was the introduction of CMP and TERC (another NSF funded curriculum

published by Dale Seymour -- designed for grades K - 5) in the Palo Alto school system that sparked the initial parental revolt which became the California Mathematics Wars.

It was the introduction of Everyday Mathematics in the Princeton Township School District, which led to the parental revolt in Princeton. This led to the involvement of a number of faculty members in both mathematics and physics at Princeton University and the Institute for Advanced Study in Princeton in trying to reform mathematics teaching in the district.

It was the use of TERC in one school system in Massachusetts, which prompted numerous members of the Harvard Mathematics Department to sign the open letter to Secretary Riley.

The support for these programs in the Department of Education is ultimately the responsibility of the Education and Human Resources Department, EHR, at the National Science Foundation. EHR funded the development of at least six of the "exemplary and promising" programs.

It is also probably worth noting that at the present time there is no valid research which shows that any of the programs of this type are effective.

At least equally important are the Systemic Initiatives funded by EHR, which

have the objective of pushing the districts where these initiatives are awarded to adopt curricula in mathematics which align with the 1989 NCTM Mathematics Standards.

In California, there is one systemic initiative from EHR still functioning, a grant to Los Angeles Unified School District, LAUSD, the nations second largest district with 711,000 students. The people involved in this initiative resisted attempts to change the system in place there, while similar districts such as Sacramento Unified began to make major changes. Two years ago, the two districts had equally bad scores - around the thirtieth percentile - on the California Statewide mathematics exams. This last year LAUSD had essentially the same score as previously while the Sacramento Unified scores jumped dramatically, particularly in the lower grades, due to their shift away from whole language and constructivist math.

Incidently, I had been told two years ago that getting a grant from EHR in a mathematics related area required that one buy into the list of ideas discussed above. As a test of this I obtained all the (over 4000) abstracts for the last 9 years from EHR for awarded grants that involved mathematics. I tested a random sample of about 200 for a few key phrases such as NCTM Standards, group learning, and discovery learning. All but four of them contained at least one of these phrases.

In conclusion, I believe that the sad state of mathematics education among high

school graduates in this country is primarily the responsibility of two agencies: the Department of Education and Human Resources at the NSF, and the Department of Education. The programs they develop and push simply set too low a standard.

Appendix H For The Written Statement Of Mark Schwartz, Parent, Livonia, Michigan.

Mark H. Schwartz

A Parent's Personal Perspective

My name is Mark Schwartz. I speak today as a concerned father. I also speak as a business-owner, and employer of engineers and computer scientists.

Lessons Learned in Bloomfield Hills

In 1993, a radical approach for teaching mathematics to high schools students called Core Plus (CP) was adopted at Andover High School in Bloomfield Hills, Michigan, and launched as a pilot program. Students had no options out of the program, except to switch high schools and that escape route was later precluded. In the summer of 1997, several, if not all, of the first wave of CP students, who took math placement tests at college, experienced difficulties with these tests. (This is not surprising, since math placement exams tend to emphasize algebra, whereas CP instead emphasizes manipulating calculator keys.)

Horror stories from the freshman college years of Andover graduates with several years of Core Plus training were told directly to the Bloomfield Hills school board and school district superintendent, to no avail. A favorite tactic of these administrators was to meet with parents individually and either blame their child's math difficulty on not being a good student, or to blame the college which gave the entrance exam for not being forward thinking.

In an attempt to squash the tales from spreading the West Bloomfield and Bloomfield Hills school boards held a joint meeting. This evening turned into a debacle when parents took to the floor to vent some of their frustrations. Ironically, the majority of the parents in attendance discovered the NNM programs were in place by coming to what they thought was a promotional event to extol the greatness of the math programs, but which was really an attempt to extinguish growing unrest.

Luckily, our community is home to many of the technological white collar staff associated with the auto industry. Also, a very high number of medical personnel with extensive training in science and math are residents. When the school district stonewalled all requests to even investigate the cause of the CP graduates problems, a number of these parents, including myself, joined to form "Bloomfield Hills Parents for Excellence in Math Education." (BHPEME) which is a grass roots effort to support the best math curriculum for all students. Rather than trying to completely throw out the reform math program, our organization requested choice of a traditional math program in addition to the CP. We believe that parents should be able to make their own decision on such an important issue. Therefore, if some parents want CP we do not propose to take it away from them any more than we want our needs ignored.

BHPEME collected signatures on a petition for choice, went to school board meetings, held our own meetings, and attended school sponsored discussions. The Bloomfield Hills school district used all its resources to push the CP program and reform education. They brought in their own speakers to support reform math which they then broadcast around the clock on the local cable channel. The best "statistics" the Bloomfield Hills school district offered at any time was that ACT scores did not decline over the last five years

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Finally in an attempt to assist BHPEME and resolve the issue of effects of CP, Professor Bachelis of Wayne State University, single handedly took on the task of investigating the impact of CP on the high school graduates by way of an extensive survey. Bachelis' survey of the class of 1997 was analyzed by Professor James Milgram of Stanford University. As a result of our organization efforts, but primarily due to the press given the work of Bachelis and Milgram, the Bloomfield Hills School District felt sufficient pressure to "band aid" CP by adding back more quantitative problem solving, and very begrudgingly adopted choice between CP and traditional math at Andover.

The take home history lesson is that Core Plus and other integrated math programs are such a radical departure from the time tested ways of teaching mathematics that they cannot be introduced in a wholesale fashion. The Bloomfield Hills school district should have provided a safety net for the Core Plus student pioneers. They did not, but rather the school system let them twist in the wind. NNM proponents are obviously willing to use high school students as guinea pigs.

The riddle therefore goes:

Q. Why is a new-math textbook like a guinea pig?

A. Because a guinea pig doesn't come from Guinea and it isn't a pig.

While there is some comedy in comparing NNM texts to domesticated rodents, there is only tragedy in making laboratory subjects out of children. If medical doctors experimented on our kids bodies with no consent, much less justification, they would be in jail only as fast as the lawyers could sue to judgment and sentencing.

Analogies to the Business World

In the early 1980's, the American auto industry was under assault by the Japanese automobile companies. The oil embargo, and its resulting high gas prices, gave the Japanese a foot in the door with their subcompact vehicles. However, the quality of the Japanese cars gained a strong following. We watched as General Motors lost market share, and the US government had to prop up Chrysler, as the US automobile industry went through a wrenching, industry-wide transformation. The competitive pressure from the Japanese forced a reluctant US auto industry to completely transform its operations, policies, and culture.

The educational system is precisely where the US auto industry was in 1980 – institutionalized, inefficient, and stagnant. The only thing that could have forced GM to change was competition. The same is true of today's educational system.

The justice department recently filed suit against Microsoft for monopoly practices, and then suggested that Microsoft may need to be split into three companies. Yet, every year Microsoft delivers more software, better software, and cheaper software for consumers. They have done this so successfully that Microsoft is now one of our nation's jewels.

Meanwhile, the justice department ignores the largest monopoly in the world – the United States public education system. Every year the public schools deliver lower quality students, and spend more money doing so. They produce students who are not prepared to compete in our modern world. They stifle the efforts of teachers, and they alienate their consumer – parents.

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If we truly wish to transform the public education system, we must do what the Japanese did to our auto industry – we must put the pressure of competition and innovation into the equation. We must give parents choice!

The Constitution is quite clear in leaving the selection of math curriculum to the local level. Amendment 10 states:

> The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

Centralized control of our educational system, which is exemplified by over-reaching control by the Department of Education is not only a formula for disaster, but goes against our very foundations of governance.

I believe that our way of life in this great nation is founded in a great principal – Liberty. Our founding fathers warned us that Liberty requires personal responsibility. We know that personal responsibility is founded in a good education. The Founders understood that local control and accountability provided the best formula for success, as well as change. I hope this respected assembly would embrace their wisdom.

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Appendix I-The Written Statement Of Susan Sarhady, Parent, Plano, Texas and additional materials submitted for the record. .

Testimony of Susan Sarhady

Before the

U.S. House of Representatives Committee on Education and the Workforce,

Subcommittee on Early childhood, Youth and Families and the

Subcommittee on Postsecondary Education, Training and Life-Long Learning

February 2, 2000

Thank you for giving me the opportunity to testify before you today It is truly a privilege It is difficult to know how to condense the issue that has consumed my life for over a year and a half into testimony for this hearing. There is no "Doctor" in front of my name, I don't work for the government, I don't have a particularly distinguished resume. I couldn't get past second semester calculus in college I know little of national statistics, and cannot debate the latest brain research and how it relates to teaching math But I do know my children and how they learn And so, I am here simply as a parent, the provider of a couple of those children without whom all of this is just talk. When decisions about education are made here, it is the kids and families at the "front lines" in the math wars that deal with the intended and unintended consequences And I must impress upon you that I truly believe that unless families also buy into the educational reforms we are talking about here today, we will never succeed – no matter how good the program, no matter how dedicated the teacher, no matter how much money we spend Whether you agree with the concept of "reform math" or not, you must agree that it is controversial and without a proven track record. That alone is of great concern to parents

So, I am going to tell you OUR story It is the story of the undertaking of a pilot and eventual adoption of Connected Math in the middle schools in our community It is the story of my friend Sally who ran to the store late one night to pick up a bag of marshmallows for her son's math homework. They had to be tossed in the air to see whether they landed on their ends or on their sides When her boys took an

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entrance exam for a private school, the youngest, in his first year of Connected Math, qualified, but the oldest, in his third year of Connected Math, didn't because of his lack of Algebra skills. It is the story of Melinda whose gifted son has never scored below a 90 on any portion of the ITBS, who during his second year in Connected Math scored a 74 on math computation. It is the story of my neighbor Jill, who spoke with me in exasperation about her son's poster for his first math unit project called the Special Number project. The assignment reads, "Many people have a number they find interesting. Choose a whole number between 10 and 100 that you especially like. In your journal, record your number, explain why you chose that number, list 3 or 4 mathematical things about your number, list three or four connections you can make between your number and your world." Mind you, this is a six-week project for 6th graders. It is the story of my friend Kathy who bought a supplemental textbook and sits at the kitchen table just about every night making her son do a half-hour of additional math to make sure he isn't missing anything. She told me, "We sit here at the table, doing all this extra work, day in and day out, and when they report those terrific TAAS (Texas Assessment of Academic Skills) scores, it will be Connected Math that gets the credit — not me. And it just makes me crazy!" There are too many stories to tell here and let me emphasize that they come from all over the country. Bess in Mankato, MN and Rhonda in Chattanooga, TN and Linda in Traverse City, MI and Marilyn in Chicago, and Betty in Okemos, MI and John in Silver Springs, MD and others who have written me these letters. I would like to ask that these be added to the official record.

We live in a lovely suburb just outside of Dallas. It has experienced tremendous growth over the last 20 years. It is clean, it is safe, has lots of parks and bike trails, a healthy economy and a school system with a wonderful reputation that entices families to make this city their home. In 1996, our school district became one of the first 6 districts in Texas to participate in the Texas Statewide Systemic Initiative pilot of Connected Math [1]. Within our district, 4 out of 9 middle schools were chosen, without parental approval, without school board approval, without so much as a public meeting, completely bypassing (with the aid of federal funds) the theory of local control. A letter from the school district called for the

release of identifiable, individual student test information, open-ended, without any kind of parental approval OR notification,[2] a clear privacy violation. There weren't any textbooks yet, just classroom copies giving the definite impression that our kids were the guinea pigs as the pilot was phased in one grade level at a time. By the third year of the pilot, parents had started publicly complaining about this "New" math program. The school district responded by mailing a flyer to every family with a child in middle school[3] and agreeing to hold a handful of public meetings. In Texas there is a state textbook adoption process and new textbooks are adopted on a seven-year cycle. New middle school math textbooks would be adopted in the spring of 1999. Connected Math was on the list of textbooks up for adoption. A few parents got together and decided on a course of action. We would try to prevent the adoption of the Connected Math textbooks by our school board.[4] We mounted what would be a publicity campaign, informing parents of the impending adoption. We worked with our school board to hold a public hearing regarding Connected Math. It took us 4 months just to accomplish that.[5] We asked that the school board authorize a survey of parents regarding Connected Math. They declined to agree to that. We filed a grievance that eventually went before the board as well.[6] It took 4 months for that to be heard. We hear that the middle school math teachers got to vote whether to adopt Connected Math. It must have passed, but 23 of those teachers did not return the following year to teach math. Twenty-three out of around 100! Eventually, despite strong opposition from parents, the school board trustees unanimously approved the administration's recommendation to adopt the Connected Math textbooks.[7] Statewide, only 6 districts adopted Connected Math. Three of those districts were from the original 6 that started the pilot in 1996.[8]

Section 26.003 of the Texas Education Code says, "A parent is entitled to request, with the expectation that the request will not be unreasonably denied, the addition of a specific academic class in the course of study of the parent's child in keeping with the required curriculum if sufficient interest is shown in the addition of the class to make it economically practical to offer the class." We traveled to Austin to give testimony before the State Board of Education citing deficiencies in the program. It happened to be the

same week the Mathematically Correct textbook reviews came out. Connected Math got an F.[9] The Commission and the State Board decided not to interfere citing local control issues. Eventually, we even filed a grievance with the Texas Education Agency asking for an investigation. The books do not conform to the state curriculum standards, in fact they fail to cover an average of 43 percent of the Texas Essential Knowledge and Skills elements.[10] It is our contention, after a review of teacher lesson plans, that there is not ample time to supplement Connected Math to cover the state curriculum standards. We expected a complete investigation of our grievance by the complaints division. Instead, the curriculum department examined the "plan" that the district has to cover all the TEKS. The plan is judged adequate despite the fact that it has no relation to what is actually happening in the classroom and the district's contention that all the TEKS are really there in the textbooks is in direct conflict with the TEA report showing 43 percent of them missing. Although it took a few months, the Texas Education Agency eventually wrote a letter, of which every middle school parent got a copy of compliments of the school district saying, "This law applies to the addition of a specific class, and does not address an instructional methodology used in the classroom."[11]

We talked to legislators asking for help. Over 2000 new laws and revisions were submitted during that legislative session. Lots of people listened but nothing changed. We gave public testimony before the Texas House Committee on Public Education.[12] There was much talk of TEC section 26.003. In fact, the committee affirmed our belief that this law applied to our request for an alternative math class. Our Deputy Superintendent happened into the hearing room, was convinced to provide testimony, and eventually admitted that yes, if there were enough parents that asked for it, it would be feasible for the district to offer an alternative. At that time we had approximately 200 signatures of parents who did not want their child taking Connected Math. The Deputy Superintendent told the committee he understood that there were only about 25 people opposed to the program. The newspapers covered the testimony and reported the Deputy Superintendent was speaking hypothetically and "didn't mean to imply we would go back and offer an alternative."[13]

We changed our focus. Perhaps we just had to show the district how much support there was for an alternative. If 22 kids out of one grade level, at one middle school requested an alternative, surely the district would need to offer it. We conducted a petition drive.[14] We asked the school district to allow us to send home, via the school district distribution system a flyer with a petition attached. In the mailings the school district was sending to parents there was no mention of the fact that Connected Math does not meet state curriculum requirements, no mention of the fact that the division of fractions is never covered, no mention of the fact that parental opposition was growing in cities where it had been introduced earlier and no mention of the factual errors in the program that caused the State of California to boot it off their adoption list.[15] But of course, the district would not let us send out our information. So we collected addresses and spent over two thousand dollars mailing about 5500 petitions. We eventually collected 521 petitions asking for a specific, alternative math class. We informed the school district which refused to look at the petitions.[16]

After the Connected Math textbooks were adopted, the curriculum department told the school board that they would write a curriculum that would encompass all the state curriculum standards and make it available to the board for review. In our city, the only way to give public testimony before our school board is if the item you want to speak about is on the board agenda. In June, the new middle school math curriculum was presented to the board for its consideration. With the help of the Texas Justice Foundation, a non-profit public interest litigation foundation, we presented our 521 petitions asking for a specific class.[17] The answer? School Board member Alan Bird told us in part, "What we're clearly talking about is instructional methodology, we're not talking about a course. And if somebody doesn't like the way that a teacher instructs something in a classroom, I think it is the responsibility of that parent to go over it with the teacher." In closing, School Board President John Muns told us, "We will not have this item on the agenda again."[18]

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Last August, as a last resort, six parents represented by the Texas Justice Foundation and seeking class certification filed "federal litigation against the Plano Independent School District for violations of the parent's constitutionally protected rights of free speech/expression, equal protection and the fundamental right as parents to direct the education and upbringing of their children."[19] Now, when I communicate with the school board that I have concerns

- because the supplemental material is not being taught as required in the curriculum
- or that a teacher requires his students, at the beginning of class, to come and get a calculator from his desk
- or that a student asking for clarification was told by his teacher to figure it out for himself
- or that a middle school is asking for parent volunteers to act as monitors in a math lab devoted to timed diagnostic tests[20]
- or that the district has added a $39,000 position to help with parent meetings and "provide support to the PISD Communications Department with regard to the publicity of the mathematics program"

the school board members tell me that, on advice of attorney because the matter is under litigation, they cannot discuss the Connected Math issue

So, we've devoted a year and a half of our lives, and a considerable amount of money to getting rid of Connected Math in our district, if not for everyone, then at least for the parents that request it. Then, last October I was amazed to read that the Department of Education had issued a report recommending Connected Math and calling it exemplary. I couldn't believe it. Within days the school district had principals handing out copies of the press release at parent meetings.[21] They even printed the news in their District Employee Newsletter.[22] They also made sure the local newspaper got a copy and of course, it made front page news. The secondary math coordinator was quoted as saying "he considers the selections of Connected Math a vindication of the district's choice to implement it."[23]

I read the actual report that identified the expert panel system, the evaluation criteria and the statistical measurements of effectiveness. I naively assumed that it must have been an impartial process and that the criteria would be meaningful to parents. The measurement of the program's effectiveness and success in Texas was the percentage of students meeting the minimum expectation on the Texas Assessment of Academic Skills (TAAS) test. Even I know that passing the TAAS is no measurement of achievement, minimum skills competency perhaps, but certainly not math achievement. An expert panel composed of 14 "educators, scientists, mathematicians, and policymakers with extensive experience in mathematics and science education" was assembled. Let's look at some of the members. Jack Price is a former president of the National Council of Teachers of Mathematics, an organizations that promotes (you might say) reform math. James Rutherford is a member of the American Association for the Advancement of Science. That group, partially funded by the NSF, already came out with a report endorsing Connected Math. Janice Earle is from the National Science Foundation. They partially funded the development of Connected Math. Steven Leinwand is on the NCTM Board of Directors. They developed those standards by which Connected Math is measured. Jan Tuomi is on the National Research Council. There's that word national again. To me at least, this was not an impartial panel.

The panel developed their own criteria. There are 8 criteria and 39 indicators. Here are a few of them.

- "The program's instructional design is engaging and promotes learning." (What instructional design wouldn't purport to promote learning?)
- "The program's learning goals are explicit and clearly stated." (But are the goals accomplished?)
- "The program's content reflects the nature of the field and the thinking that mathematicians use." (Obviously not all mathematicians, since the California State Board of Education rejected this program for use in its schools based on recommendations from.....mathematicians.)
- "The program's learning goals include important concepts within the subject area." (According to a review of Connected Math performed by Dr. Wayne Bishop for the California State Board of Education, the important concept of dividing fractions "does not appear to exist" in this program.)

- "The program's learning goals can be met with appropriate hard work and persistence." (As opposed to what?)
- "The program's instructional design provides for diverse interests." (How about my interest that my child be prepared for higher math??)
- "The program's learning goals reflect the vision promoted in national standards in mathematics education."

Oh, now I see. Millions of dollars have been spent to design math programs that align with the NCTM standards, millions more are spent by the Statewide Systemic Initiatives to "reform science and mathematics education for all of its students by reforming curriculum and assessment through changes in teacher development."[34] Then, even more is spent to issue a report saying the end product of the millions spent is exemplary. But, the effect of all of this on student achievement is a hotly debated topic. And, most importantly in my humble opinion, parents have been left out of the whole process.

You asked "what role the federal government should play in improving mathematics instruction in our schools." I would ask that much stricter controls be put into place to prevent schools from using untested programs without informed consent from the parents and students. Some of us have the fortitude to take on our local school districts, but we cannot take on the federal government as well. True local control must include from the outset, not just administrators, but parents as well. At the very least, the federal government should first do no harm.

APPENDIX

1. Information from the Texas Statewide Systemic Initiative website regarding Connected Math and Texas Sites.
2. Two letters from Marilyn Brooks, Associate Superintendent for Curriculum and Instruction authorizing TEA to release individual student data.

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3 Plano Independent School District document titled "Connected Mathematics Program What's It All About?"

4 Plano Star Courier article titled "*Input sought on Connected Math*", September 5, 1998

5 Dallas Morning News article titled "*Math program's critics, supporters speak out*" December 10, 1998

6 Plano Star Courier article titled "*Math program complaint filed*" December, 1998

7 Plano Star Courier article titled "*School board says 'Yes' to Connected Math*" March 18, 1999

8 List provided by the Texas Education Agency showing school districts adopting the Connected Mathematics Program textbooks

9 Mathematically Correct Seventh Grade Mathematics Review of the *Connected Mathematics Program*

10 Cover pages of the *Commissioner's Preliminary Recommendations Regarding Instruction Materials* for grade 6, 7 and 8

11 Letter dated May 21, 1999 from Superintendent Doug Otto to middle school parents

12 Transcribed testimony of Deputy Superintendent Keith Sockwell before the Texas House Committee on Public Education. Provided in electronic format, not attached.

13 Plano Star Courier article titled "*PISD says 'No' to alternative math program*" April 2, 1999

14 Copy of petition sent to approximately 5500 middle school parents

15 Page 1 of California Final Adoption Report

16 Letter from PISD to parent Ronni Jenkins denying 521 petitions

17 Plano Star Courier article titled "*Petition targets connected math*" June 17, 1999

18 Transcript of testimony before the PISD School Board regarding presentation of 521 petitions. Provided in electronic format, not attached.

19 Plano Star Courier article titled "*Parents to file lawsuit today against PISD*" August 25, 1999

20 Middle school newsletter, Hawk Tale News detailing math lab

21 Copy of hand out from Carpenter Middle School parent math meeting.

22 Copy of PISD staff newsletter containing article about Connected Math being designated exemplary

23 Plano Star Courier article titled *"Controversial math program scores exemplary rating"* October 22, 1999

24 NSF Award Abstract to the Texas Statewide Systemic Initiative

The Texas Statewide Systemic Initiative

Resources for Strengthening Mathematics, Science, and Technology Education in Local Communities

Connected Mathematics Project - Texas

The Connected Mathematics Project (CMP) is a middle school curriculum created to help develop student knowledge and an understanding of mathematics that is rich in connections within mathematics, between mathematics and other disciplines, and with applications of mathematical ideas outside the school. The assumption is that curriculum, instruction, and assessment must all work together for students to learn the powerful mathematics they need for their high school preparation and life skills. CMP was developed at Michigan State University with funding from the National Science Foundation to meet the needs of middle school students.

What is CMP-Texas?
In the summer of 1996, with support from Michigan State University and the Texas SSI, seven sites from across Texas joined in an effort to implement CMP over the next three years as a complete curriculum for grades six through eight. School districts in the state are hungry for information concerning effective curriculum and instruction for middle school students. An increasing number of schools are responding to criticism by encouraging students to take the traditional algebra course as early as sixth grade. We predict CMP will appeal to many districts as a good alternative.

The Texas SSI sponsored a CMP-Texas conference during the summer of 1996 to introduce the CMP philosophy and sixth-grade materials to site coordinators and teams of three teachers and their principals from each of 21 campuses. During 1996-97 teachers will use the materials in their classes and lead other 6th-grade staff in the use of CMP replacement units. Next summer, the SSI will sponsor a conference primarily designed for seventh-grade teachers from the Texas sites to explore the CMP curriculum. Each site has a plan to implement the CMP curriculum fully on their campuses within three years.

- CMP Texas Sites and Site Coordinators
- Initial Factors for Success
- Contact Information

Check out the CMP web site at Michigan State University for information about CMP locales around the country:
http://www.math.msu.edu/cmp

Back to Work of the SSI

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The Texas Statewide Systemic Initiative

Resources for Strengthening Mathematics, Science, and Technology Education in Local Communities

Connected Mathematics Project - Texas

CMP Texas Sites and Site Coordinators

School District	# of Schools	Site Coordinators
Austin Independent School District (ISD)	3	Ron Gonzales (512) 414-4350
Corpus Christi ISD	1	Julia Hankins juliach@tenet.edu
El Paso Urban Systemic Initiative	8	Vodene Schultz schultz@mail.utep.edu
Lubbock ISD	3	Pam Summers & Mary Upton psummer@tenet.edu
North Lamar ISD	1	Joyce Schaffer schaffer@tenet.edu
Plano ISD	4	Jim Wohlgehagen jwohl@tenet.edu
Region I Education Service Center	1	Noel Villarreal noelvill@tenet.edu

Back to Connected Mathematics Project - Texas

EXHIBIT 8

February . 1998

Mr. Keith Cruse
Director of Student Assessment
Texas Education Agency
1701 N. Congress Avenue
Austin, TX 78701

Dear Mr Cruz:

As an authorized agent of the board of trustees of Plano ISD, I request that PEIMS data be released to the Educational Productivity Council at The University of Texas at Austin beginning with the 1995 school year. Since assessment and PEIMS data will be matched with individual student data at the campus and teacher levels, the actual student name and identification number should be a part of the data in each individual student record. The Educational Productivity Council will assume the responsibility for the privacy of each district's student data in accordance with the provisions of the Family Educational Rights and Privacy Act and the Educational Productivity Council's agreement with the Texas Education Agency. This request for the release of data to the Educational Productivity Council will remain in effect until formally revoked by the district.

Sincerely,

Marilyn Brooks

Associate Superintendent
for Curriculum and Instruction

Superintendent (or other authorized agent)

cc. Educational Productivity Council
Celeste Vanhorn

Texas Statewide Systemic Initiative
Ed Fuller or Darlene Yañez

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EXHIBIT 7

February , 1998

Ms. Nina Taylor
Manager, Mainframe Client Support
Texas Education Agency
1701 N. Congress Avenue
Austin, TX 78701

Dear Ms. Taylor

As an authorized agent of the board of trustees of Plano ISD, I request that PEIMS data be released to the Educational Productivity Council at The University of Texas at Austin beginning with the 1995 school year. Since assessment and PEIMS data will be matched with individual student data at the campus and teacher levels, the actual student name and identification number should be a part of the data in each individual student record. The Educational Productivity Council will assume the responsibility for the privacy of each district's student data in accordance with the provisions of the Family Educational Rights and Privacy Act and the Educational Productivity Council's agreement with the Texas Education Agency. This request for the release of data to the Educational Productivity Council will remain in effect until formally revoked by the district.

Sincerely,

Marilyn Brooks

Associate Superintendent for
Curriculum and Instruction
Superintendent (or other authorized agent)

cc: Educational Productivity Council
Celeste Vanhorn

Texas Statewide Systemic Initiative
Ed Fuller or Darlene Yañez

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Framework for Excellence

PLANO
Independent School District

Plano Independent School District

Connected Mathematics Program
What's It All About?

This document has been produced to provide information to parents regarding the mathematics curriculum currently being taught, tested and reviewed in four of Plano ISD's middle schools. We have read with interest and concern the comments made by some parents and non-parents and hope to be able to answer their questions and concerns here and through other varied avenues of communication.

Q: What is Connected Mathematics?
A: Connected Mathematics (CMP) is a middle school mathematics curriculum. Designed for grades 6, 7, and 8, it is a problem-based curriculum connecting different areas within mathematics, mathematics to other subject areas, and mathematics to applications in the world outside school.

Q: Why are we studying changes in the middle school curriculum?
A: The curriculum in CMP offers Plano a much more rigorous middle school curriculum than we have had in the past. Plano needed a more rigorous curriculum at the middle school in order for our students to be successful in Algebra I and other higher level mathematics courses. At this point, Plano has approximately one-third of its ninth grade students enrolled in two-year algebra (a course offered to those students who are below grade level and unable to perform in a regular one year Algebra I class). Of the students enrolled in Algebra I in high school, only slightly above 60% can pass the state Algebra I end-of-course test. Our present middle school mathematics curriculum has not always provided good preparation for our students. The Third International Math and Science study shows that only the top 5% of American students can perform as well as the top 25% of students internationally.

Q: Does CMP emphasize the basic skills?
A: Basic skills are a vital part of CMP. In addition to the basic skills practice embedded in CMP, Plano teachers developed a set of worksheets to reinforce basic skills through drill and practice. These worksheets are assigned on a weekly basis. Calculators are used as a valuable teaching tool in CMP as well as in the mathematics programs at all Plano schools. However, there are times when students are not allowed to use calculators. Calculator use is left to the individual teacher's discretion as is the case in our traditional program.

Q: How has Connected Mathematics been implemented in Plano?
A: Plano is entering its third year of implementation of CMP at Armstrong, Bowman, Haggard and Wilson. Year one implemented 6th grade, year two added 7th grade, and year three will include 8th grade. Two of the sixth grade units are also being taught to the 5th grade higher level mathematics groups in the elementary schools that feed these middle schools. The schools involved volunteered to participate after studying the curriculum.

Q: Is Connected Mathematics going to be implemented districtwide?
A: New mathematics textbooks will be adopted statewide for grades K-8 during the 1998-99 school year and will be in classrooms for the 1999-2000 school year. A committee of teachers with equal representation from each of the middle schools in Plano will be recommending the new textbook for our middle schools. The CMP is one of the programs that has been submitted to state for consideration, but the state will not give us a final list until September. If this committee decides that CMP is the textbook they would like to use and if it is approved by the Board of Trustees, then it will be implemented districtwide for middle school students only. Parents and other citizens will have an opportunity to review the recommended texts and comment in writing prior to school board presentation and to the school board when the texts are up for adoption.

Q: Is there any research about Connected Math?
A: Yes. The National Science Foundation funded several curriculum projects to design and implement curriculum that was outlined in the Curriculum and Evaluation Standards developed by the National Council of Teachers of Mathematics in the late 1980's. The Connected Math Project was developed at Michigan State University with a National Science Foundation grant. Units were developed and extensively piloted in 19 states over several years with the final version published in 1996. CMP has more research behind it than the programs we currently use. It is the only program that has been developed from the ground up rather than taking an existing program and modifying it by adding suggestions for manipulatives, alternative assessment, group work, etc. Additional information is available on the Web at www.math.msu.edu/cmp/.

Q: What is the result on student achievement from implementing Connected Mathematics?
A: The CMP units have been tested extensively. Results from the Plano project have been very positive. CMP students have shown more growth in mathematics than non CMP students on TAAS (Texas Assessment of Academic Skills) the past two years. CMP and non CMP students have performed equally well on ITBS (Iowa Test of Basic Skills). We have also checked with schools that have been using CMP for several years (Traverse City, Michigan, and Bloomfield Hills, Michigan) to see how their students perform in high school. All of the schools we have contacted report that CMP students do very well in high school. Many of them have such strong mathematical backgrounds that they are able to skip Algebra I and move directly into geometry.

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Q: How is Connected Mathematics different from the math taught in the non CMP schools?
A: Content presented in the CMP is very similar to a traditional program. CMP students are required by state law to cover the same material as students in other programs. Therefore, CMP students will be well prepared to enter Algebra I. What is different is the way the content is delivered. WHAT students learn is shaped by HOW they learn. Students work individually, in pairs and in groups of four. This allows students to experience different points of view and offers opportunities for students to share their opinions and strategies about mathematical processes. Although the program provides materials for group assessment, most Plano teachers do not assign group grades other than for participation or an occasional project (both of which are minor grades). Students are assessed individually with homework grades, quizzes, tests, and projects.

Q: Where are the Connected Mathematics textbooks?
A: Class sets of textbooks were purchased for the Connected Mathematics schools. Therefore, every student does not have a book to take home. However, all homework assignments are duplicated in order for each student to have his/her own copy. Parent handbooks for each unit were developed and 25 copies of each handbook were placed in the school libraries for check-out during the 1997-98 school year to aid parents in helping their children at home. Some campuses also purchased extra copies of the textbooks and had them available in the library for checkout. The regular text book was also available for checkout if a parent wanted a resource book at home. If Connected Mathematics is adopted district wide, every child will have a textbook.

Q: Do teachers receive training in order to teach Connected Mathematics?
A: Teachers have received training in CMP. All teachers in the project attended a week-long training during the summer before they began implementation with an additional two-day training the following summer. These teachers have also had additional training one day a month throughout the school year. Fifth grade teachers teaching the units to accelerated students also received training in the units they teach. Since CMP is so heavily correlated to the Texas Essential Knowledge and Skills and the basics of mathematics, our teachers were already very well prepared in terms of curriculum - the only difference is the methodology of delivery.

Q: Have parents been given information about Connected Math?
A: Teachers have worked hard to keep parents informed about the program. All pilot schools send letters to all parents of entering sixth grade students explaining the program and its goals. Parent nights have also been held at each of the pilot schools where the program has been explained and sample lessons taught since its inception. Additional informational sessions have been scheduled at all of the non CMP schools for the fall of 1998. Additionally, teachers are always available to discuss individual student achievement with parents.

Q: Is this anything like the old "new math?"
No. The content of CMP is based on traditional mathematics concepts. The difference is that instead of working on computation skills alone, the students learn mathematics in the context of actual situations, such as those they will have to face in the work place.

Q: Where can I learn more about Connected Math?
Parent information meetings will be held as follows: Schimelpfenig Sept.10, 7:30 pm; Bowman, Sept.15, 7:00 pm; Renner, Sept.17, 7:00 pm; Frankford, Sept.23, 7:00 pm; Robinson, Sept.28, 7:00 pm; Hendrick, Oct.12, 7:00 pm. Please feel free to talk to your child's teacher or school principal about the mathematics program if you have any additional questions, or call Jim Wohlgehagen, coordinator of mathematics for PISD, at 519-8160.

Plano Independent School District
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Plano, TX 75075

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Input sought on Connected Math

Program discussion sessions scheduled

By BETHANY RUSSELL
News editor

Connected Math, the pilot instructional program that has raised the ire of some Plano parents, promises be a topic of discussion for quite a while. And to keep the information and dialogue flowing constructively, Plano Independent School District has rolled out a new schedule of discussion nights.

The Connected Math Project has been taught at Armstrong, Bowman, Haggard and Wilson middle schools for the past two years. The district is now considering expanding the CMP to all middle schools in PISD as part of the regular curriculum. Parents with questions and concerns about Connected Math and what it means for their children are invited to attend the following programs:

- Sept. 10, 7:30 p.m. at Schimelpfenig Middle School, 2400 Maumelle Drive;
- 7 p.m. Sept. 15 at Bowman Middle School, 2501 Jupiter Road;
- 7 p.m. Sept. 17 at Renner Middle School, 5505 Plano Parkway;
- 7 p.m. Sept. 23 at Frankford Middle School, 7706 Osage Plaza Parkway;
- 7 p.m. Oct. 12 at Hendrick Middle School, 7400 Red River Drive; and
- 7 p.m. Oct. 13 at Robinson Middle School, 6701 Preston Meadow Drive.

PISD secondary math coordinator Dr. Jim Wohlgehagen will present the programs along with teachers who work with Connected Math.

Connected Math is described by the district as "a problem-based curriculum connecting different areas within mathematics, mathematics to other subject areas and mathematics applications in the world

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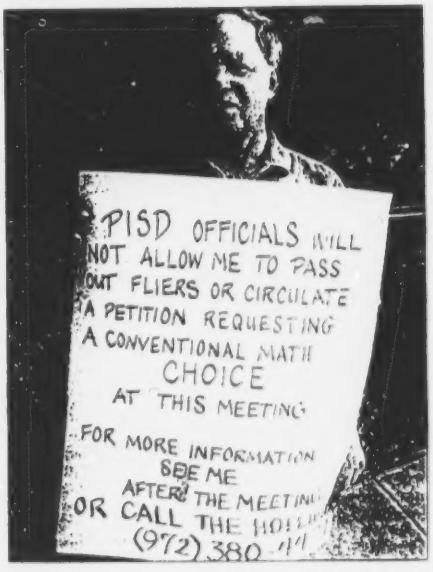

Michael Woods/Staff photo

Al Kirke displays a sign expressing his frustration with the Plano Independent School District board in the controversy over the new Connected Math Project, currently being taught at four middle schools.

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Math

From 1A

outside school." The curriculum is designed for sixth, seventh and eighth grades.

Wohlgehagen has proposed the CMP is solid curriculum that enables children to better master the concepts of mathematics.

Parents have expressed several concerns about the program, which encourages students to "discover" concepts instead of memorizing formulas and rules. Among concerns voiced are the lack of test data on the project and the difficulty students may have in adjusting to traditional math courses after completing the program.

Parents organized against CMP say what they want is an alternative.

"Our complaint is not so much the Connected Math Program but a lack of an option for conventional math," said Al Kirke, a parent who is circulating a petition requesting PISD offer more traditional math courses as an option.

Wohlgehagen has said that if the CMP is adopted into the district's math curriculum, students will not be able to opt out.

Kirke, an engineer with an electronics company in Richardson, said his recent attempt to circulate the petition and pass out fliers was stifled by PISD personnel at a recent math night to discuss CMP. So on Tuesday, he attended a second math night — this time armed with a poster that stated his predicament: "PISD officials will not allow me to pass out fliers or circulate a petition requesting a conventional math CHOICE at this meeting."

Though requested to put away the sign by PISD staff, he and other parents have established a hot line, 972-380-4421.

School officials said they are not trying to suppress opposing views, but want lines of communication — and parents' minds — open at the meetings.

Statistics show that, on the whole, students at Armstrong, Bowman, Carpenter and Haggard middle schools, where Connected Math is taught, have improved their TAAS math scores.

Contact news editor Bethany Russell by e-mail at Russell@scripps.com or phone 972-424-4585, Ext. 249.

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Math program critics, supporters speak out

District looking into expanding curriculum to all middle schools

By Sandy Louey
Staff Writer of The Dallas Morning News

For more than three hours Tuesday night, residents offered pros and cons of a controversial math program in the Plano school district.

The Connected Math Program is in its third year at Armstrong, Bowman, Haggard and Wilson middle schools. District officials are looking at expanding the pilot program to the remaining middle schools when new textbooks are adopted in the spring.

District officials have said Connected Math is a curriculum that emphasizes group problem-solving and deep understanding and thinking, with less emphasis on repetitive practice and calculations.

A textbook adoption committee of teachers and administrators is scheduled

■ Bond vote to address technology. 2H

to present its recommendations to trustees in March.

School board President John Muns said the board took the unusual step of holding Tuesday night's work session in order to give parents and others the opportunity to express their concerns about Connected Math.

"We have in no way made a decision on this," he said.

Mr. Muns said he was disappointed that a group of parents opposed to Connected Math filed a complaint with the district last week even though the work session had already been scheduled.

"We did give them an opportunity to come and speak with us," he said.

After district officials provided an overview of Connected Math, almost 30 people addressed trustees.

The increase in the percentage of students passing the Texas Assessment of Academic Skills was larger in schools with Connected Math, while there was little difference in the Iowa Test of Basic Skills results between schools with the program and those without, said Dr. Priscilla Kimery, director for research and evaluation for the district.

The district will continue to study the data to see what impact that the program has had because many factors affect student performance, she said.

Ronni Jenkins was one of the seven parents who filed a complaint Friday with Associate Superintendent for Curriculum and Instruction Marilyn Brooks, contending that Connected Math is of "of dubious academic merit."

The complaint asks the district to withdraw the Connected Math program from the textbook-adoption process and asks that the pilot program be discontinued.

Mrs. Jenkins said Tuesday night that parents were never consulted about Connected Math and should be given an option of having their children remain in a

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Math program's critics, supporters speak out

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more traditional math curriculum.

"This is about choice. It's about our kids," she said.

Timothy Soh, a Carlisle Elementary School parent, said there is not enough data yet to show the long-term effects of Connected Math and students should not be used as guinea pigs.

Many of those who spoke in favor of Connected Math were teachers in the program. They said Connected Math gives students a better understanding about mathematical concepts and how to apply them.

> "This is about choice. It's about our kids."
>
> — *Ronni Jenkins*

"They understand what they're doing," said Wilson math teacher Kellie Terwilliger. "It's not just skill and drill."

Wilson parent Jon Anderson said his sixth-grade daughter enjoys Connected Math because it makes math interesting and relevant for her.

"It makes things fit together," he said.

Trustee Mike Evans said he was concerned that Connected Math has made the textbook-adoption process political.

"We've turned this process into a political circus," he said.

Trustee Gary Base said he favored holding the work session.

"I don't feel politics is involved in this," he said. "It's better to have it now than waiting too long."

Superintendent Doug Otto said an independent committee of local business leaders will review the middle school math curriculum and present a report to trustees by the end of February.

Sandy Louey can be reached on the Internet at slouey@dallasnews.com.

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Math program complaint filed

Parents' group asks abolition of Connected Math approach

By KELLI CONLAN
Staff writer

A group of parents opposed to the middle school Connected Math program filed a formal complaint this week with the Plano school district administration.

The complaint asks for the program to be abolished and that textbooks for the courses be dropped from adoption consideration.

"We'd like for (the Connected Math program) not to be used until it meets the state standards for one, and we would like to have a voice in this process," said Kenny Johnson, a parent who is footing the legal bill for the complaint and another that will be filed soon with the Texas Education Agency.

This week's complaint was sent to Marilyn Brooks, associate superintendent for curriculum and instruction. Brooks was out of the office on vacation Friday and could not be reached for comment.

Twelve parents — representing Frankford, Armstrong, Hendrick and Haggard middle schools and Carlisle Elementary School — signed the letter, which outlines their complaints. They say no parents were consulted about the decision to have their children placed in a pilot program for Connected Math, that parent meetings on the program were

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Math

From 1A

for information only and no parents were allowed to give feedback or hand out materials.

The parents also want more involvement in the adoption of textbooks. Presently, a team of teachers makes a recommendation to the school board on books to be used for each school year.

"We want a say in this math decision and a voice in the choices of curriculum in the education process at PISD," Johnson said. "This grievance isn't just about the parents who signed this. It's for all parents who are concerned."

The parents also do not want books chosen from the nonconforming list, although they are approved by the State Board of Education.

The board compiles two lists: conforming and nonconforming. Conforming means the book covers 100 percent of the Texas Essential Knowledge and Skills, which are determined by the Texas Education Agency. Nonconforming books meet at least 50 percent of the skills required by the state. School districts may pick from either list.

According to the grievance, the sixth-grade textbook meets 72 percent of skills and the seventh- and eighth-grade books meet 54 percent and 55 percent of skills, respectively.

The school board will hear parent feedback about the program during a work session after its Tuesday meeting. Parents filing the complaint said they are pleased they have that opportunity.

"I hope the board will see it's not just one or two people who are concerned about this," said Sally Smith, who signed the letter and is the mother of two boys at Haggard Middle School. "This has nothing to do with the teachers. What we're trying to get across is it's the curriculum we're concerned about — it's not working for all kids."

Contact staff writer Kelli Conlan at 972-424-4585, Ext. 265, or by e-mail at kelli_conlan@hotmail.com.

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PLANO STAR COURIER

Publication date - Thursday, Mar 18, 1999

School board says 'Yes' to Connected Math

- **Officials pledge to supplement curriculum with other materials**

By KELLI CONLAN
Staff writer
The school board voted unanimously to support all textbook recommendations at its meeting this week, including the controversial Connected Math series of books for middle school students.

After close to 30 people, including parents, teachers, middle school principals and community members, spoke their mind on the issue, the school board voted 7-0 to use the books beginning next fall.

Although the math textbooks were adopted, Marilyn Brooks, associate superintendent for curriculum, said they will be supplemented with other materials and a new curriculum will be written.

"I do support the program; however, we do not want a canned program," Brooks said. "We have to write our curriculum so that we are very sure that we are covering what some people call traditional mathematics. We all want to make sure our children know how to compute."

Next year, all sixth-graders in the district will learn from the books, and seventh- and eighth-grade classes will be phased in over two years. The program was piloted at several district middle schools for the past three school years.

Prior to the board's vote, the math and other textbooks were evaluated by a citizens textbook adoption committee and a district committee composed of teachers and administrators.

For some board members, it came down to deciding whether the process by which the program has been implemented was corrupt.

"If I believe the process is sound, I have to believe the recommendation is also sound," trustee Mary Beth King said.

Some parents with students in the program urged the board Tuesday to refuse the recommendation.

Helen Chang, a parent and electrical engineer, said she cannot support the program because it is not the kind of math she learned.

"I want my child to succeed," she said. "I am pleading with the district not to overhaul and expand the project to every school. Give us a choice."

Eva Hemmi said her eighth-grade student comes home crying almost every night because she doesn't understand the homework.

"I can't even count the tears," she said. "I wish there would have been a choice. I think she is really burnt out on math."

Board members responded by saying in every classroom there are some students who get it and some who don't.

"I think it's a difficult program. I think it's tough," said trustee Mike Evans. "Kids have problems, and that's just part of the learning."

Tom Leyden, principal at the soon-to-be-opened Rice Middle School, also said, "There are some kids who learn better this way and there are some kids who learn better that way, and the teacher is going to take that into consideration."

Teachers who spoke to the board said the program has a lot to offer them and their students.

"Teaching (the Connected Math program) was refreshing and made me excited about teaching again," said Margaret Cregg, a teacher at Armstrong Middle School. "When I began teaching the ... program three years ago, I truly felt we had found a much better way to teach math. Our gut feelings about the strengths of this program proved to be right."

Jim Wohlgehagen, PISD's secondary mathematics coordinator, said the district was considering a new way to teach math because many ninth-grade Algebra I students haven't performed well because they do not leave middle school with a "good conceptual understanding" of math.

"The way it is presented in the connected math program will give them that good conceptual understanding," he said. "Even if we weren't having a problem in algebra, we'd still be looking for a better way to teach math."

A member of the district's textbook adoption committee also spoke about why she voted for Connected Math.

"I can assure you that the task of reviewing the materials was not taken lightly," said Kay Neuse. "I am confident the recommendation being given tonight is indeed the (textbook) series that will provide the greatest opportunity for students to truly learn mathematics."

Also included in the book list adopted by the board were choir, geology, oceanography and meteorology books for high school students, math books for elementary school students, and technical theater and world history books for high school students.

In addition to utilizing the state-purchased textbooks, the district will spend $106,991 on supplemental materials, including CD-ROMs and laser discs for world history, lab manuals for geology and graphing calculators for middle school math classrooms.

The district began the math pilot program at four Plano middle schools - Armstrong, Bowman, Haggard and Wilson.

Soon after, a group of parents began protesting the district's decision saying parents were not consulted on the decision and the program was deficient.

They also argued the books were placed on the nonconforming textbooks list issued by the Texas Education Agency. The agency makes two lists: conforming -- meets 100 percent of Texas Essential Knowledge and Skills, and nonconforming -- meets at least 50 percent of TEKS. School districts may

choose books from either list.

A group of 12 parents also filed a grievance with the district. At its last meeting, the school board took no action on parent suggestions of ways to resolve the issue.

School board president John Muns said he was glad the decision has been made.

"We have had plenty of input on this item," he said. "I, for one, am ready to move on."

In other action Tuesday, the school board also:

- Passed resolutions honoring Music in Our Schools Month and Youth Art Month.
- Terminated employment of teachers on probationary contracts who have not completed certification.
- Heard a legislative report by superintendent Doug Otto, who said he and other district officials were to meet with leaders of the state House of Representatives Wednesday.
- Heard a budget report as a reminder that difficult decisions, including whether to privatize bus service, how to adjust class sizes and what to do about low-enrollment courses, will be on the agendas of upcoming meetings.

Contact staff writer Kelli Conlan at 972-424-4585, Ext. 265, or by e-mail at kelli_conlan@hotmail.com.

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LIST OF TEXTBOOKS ADOPTED IN TEXAS
CONNECTED MATH
RECEIVED FROM TEXAS EDUCATION AGENCY

0769004520		**Connected Mathematics Program**		
0769004520	015908	SOUTH SAN ANTONIO ISD	819	0
819				
0769004520	015911	EAST CENTRAL ISD	11	0
11				
0769004520	043910	PLANO ISD	4,030	0
4,030				
0769004520	071902	EL PASO ISD	1,305	0
1,305				
0769004520	071904	SAN ELIZARIO ISD	263	0
263				
0769004520	227901	AUSTIN ISD	2,800	0
2,800				
0769004520			**9,228.00**	
0.00			**9,228**	
0769004539		**Connected Mathematics Program**		
0769004539	015908	SOUTH SAN ANTONIO ISD	799	0
799				
0769004539	015911	EAST CENTRAL ISD	638	0
638				
0769004539	043910	PLANO ISD	3,806	0
3,806				
0769004539	071902	EL PASO ISD	1,231	0
1,231				
0769004539	071904	SAN ELIZARIO ISD	275	0
275				
0769004539	227901	AUSTIN ISD	2,100	0
2,100				
0769004539			**8,849.00**	
0.00			**8,849**	
0769004547		**Connected Mathematics Program**		
0769004547	015908	SOUTH SAN ANTONIO ISD	802	0
802				
0769004547	015911	EAST CENTRAL ISD	652	0
652				
0769004547	043910	PLANO ISD	3,818	0
3,818				
0769004547	071902	EL PASO ISD	1,069	0
1,069				
0769004547	071904	SAN ELIZARIO ISD	280	0
280				
0769004547	227901	AUSTIN ISD	2,100	0
2,100				
0769004547			**8,721.00**	
0.00			**8,721**	
Grand Total:			**26,798.00**	
0.00			**26,798**	

Mathematically Correct Seventh Grade Mathematics Review

Dale Seymour Publications
Connected Mathematics Program

Lappan, Fey, Fitzgerald, Friel and Phillips
Menlo Park

Introduction

This is part of a series of second, fifth, and seventh grade Mathematics Program Reviews. This review includes a summary of the structure of the program, evaluations of a selected set of content areas, and evaluations of program quality. Ratings in these areas were made on a scale from 1 (poor) to 5 (outstanding). The overall evaluation was made using the traditional system of letter grades. For details of the methods used in this evaluation see Methods for Seventh Grade Program Reviews.

Student Text Structure

This course is composed of 8 "books" of about 70-90 pages each.

Each book is arranged around a mathematical topic

1. Variables and patterns
2. Stretching and shrinking
3. Comparing and scaling
4. Accentuate the negative
5. Moving straight ahead
6. Filling and wrapping
7. What do you expect?
8. Data around us

Content Area Evaluations

Properties, Order of Operations [1.0]

If this topic is covered, it is extremely difficult to find. In any case, the coverage is insufficient.

Exponents, squares, roots [1.0]

This topic is very weak. Positive integers are raised to whole number powers only in the context of prime factorization. The small coverage of scientific notation includes only positive integer exponents and

heavily emphasizes the use of calculators. All other topics are completely absent.

Fractions [1.0]

This topic is missing or cryptic.

Decimals [1.0]

None of these topics are presented in this book. Expressing decimals as percents is assumed. Perhaps students were taught to make this conversion on their calculators in an earlier grade.

Percents [1.2]

There is no evidence of development of this topic in this book. At the start of book 3 "percent" is described as one of the "terms developed in previous units." Perhaps so, but if so, the level of development was low. There is certainly no teaching of percent. Some percent problems are intermixed with ratio problems in the various exercises, but there is no instruction on interconverting fractions, decimals and percents. There are almost no word problems on discount, markups, commissions, increase or decrease. Some "scale factors" for similarity are expressed as percents.

Proportions [3.5]

This is an adequate treatment of this topic. Most of the grade 7 topics are covered at some level. It is interesting that although proportions are used relatively often, by the standards of this book, they are not referred to as such as the authors have decided to put "proportion" in the list of nonessential terms at the front of the book.

Expressions and Equations - Simplifying and Solving [1.1]

This book is devoid of algebraic manipulation. The only solving of equations is graphical, and that is limited to problems involving direct variation. It is difficult to see how a student can become prepared for any mathematics-based profession with this little instruction in the key skills leading to algebra.

Expressions and Equations - Writing [2.1]

This book has a heavy emphasis on using proportions to find the lengths of similar parts of similar figures. On the other hand, there is very little practice or instruction in writing equations from a verbal description. The problems related to this topic are stretched over an excessive period of time as students answer endless questions about the situation. Essentially all of these problems are dealt with via tables and then in a graphical context.

Graphing [4.0]

The one advantage of the heavy emphasis that this book places on graphical over analytic solutions is that graphing is covered moderately well. Nearly all topics that should be covered are covered.

Shapes, Objects, Angles, Similarity, Congruence [2.5]

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Formulas and derivations, or even "discoveries" of area of two dimensional figures are not given. They may be assumed to have been mastered at an earlier year. Surface area and volume are "discovered" in a long series of construction projects, many of which look doomed to failure. At the end of this formulas that have been discovered are not explicitly stated in the text. The teacher's manual suggests that the appropriate formulae will "come out" in discussion. If the student discovered the wrong formula, or forgot to write it down, good luck, since there is no way to look back and remember a formula.

The exercises on finding volumes of irregular objects using displacement are interesting extensions. On the other hand, much of the teaching is absurd and again abjures analysis for experiment. For example, students spend who-knows-how-much-time filling cylinders and cones with beans to discover, approximately, the relationship between the volume of cylinders and the volume of cones. This is a waste of time and inaccurate. Unfortunately, this could describe many of the activities in this book.

Area, Volume, Perimeter, Distance [1.0]

Essentially none of the grade 7 level topics are covered. They may be assumed from previous years, but one cannot assume that from the presentation.

Program Quality Evaluations

Mathematical Depth [1.7]

There is very little mathematical content in this book. Students leaving this course will have no background in or facility with analytic or pre-algebra skills.

Quality of Presentation [1.4]

This book is completely dedicated to a constructivist philosophy of learning, with heavy emphasis on discovery exercises and rejection of whole class teacher directed instruction. The introduction to Part 1 says "*Connected Mathematics* was developed with the belief that calculators should be available and that students should decide when to use them." In one of the great understatements, the Guide to the Connected Mathematics Curriculum states, "Students may not do as well on standardized tests assessing computational skills as students in classes that spend" time practicing these skills.

Quality of Student Work [1.5]

Students are busy, but they are not productively busy. Most of their time is directed away from true understanding and useful skills.

Overall Program Evaluation

Overall Evaluation [1.7]

This rating is perhaps deceivingly high, as 7 of the 11 topics rate no higher than 1.2. The rating is as high as it is based largely on two high subscores, proportions and graphing. It is impossible to recommend a book with as little content as this and an inefficient, if philosophically attractive, instructional method.

The TEA review has determined that Connected Math does not conform to the state-mandated standards for teaching math in middle school (TEKS). This is the full report for eighth grade.

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Commissioner's Preliminary Recommendations Regarding Instructional Materials Submitted for Adoption Under Proclamation 1996 September 15, 1998

Mathematics, Grade 8
42 TEKS Total

PUBLISHER: Addison Wesley Longman, Inc.
TITLE OF PROGRAM: Connected Mathematics Program
GRADE: 8
SUBMITTED FOR CONFORMING LIST? Yes
PRELIMINARY RECOMMENDATION: Nonconforming (19)

A number in parentheses after the recommendation indicates elements of essential knowledge and skills (TEKS) not addressed.

Key to Attachment

Program [1]	Reviewers [2]	TEKS [3]	No/Yes [4]	Majority Rule [5]	Number of TEKS Not Addressed [6]	Status [7]

1. *Program title.*
2. *Number of State Textbook Review Panel members who reviewed the program.*
3. *TEKS about which panel members had differing conclusions or that all agreed were not addressed.*
4. *Number of how many said no or yes.*
5. *Preliminary determination (by consensus or majority rule) of whether or not a TEKS element is addressed.**
6. *Total number of TEKS determined to be not addressed or needing documentation.*
7. *Preliminary recommendation.*

*Methodology for preliminary determination:

All yes	=	(Y) Yes
Majority yes	=	(Y) Yes
Split decision	=	(RD) Request Documentation
Majority no, but any yes	=	(RD) Request Documentation
All no	=	(N) Not Addressed

Please refer to the Commissioner's letter for options available to publishers for response to this report. Questions and comments about this report should be directed to:

Dr. Robert H. Leos
Senior Director
Textbook Administration
[illegible]

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Commissioner's Preliminary Recommendations Regarding
Instructional Materials Submitted for Adoption
Under Proclamation 1996
September 15, 1998

Mathematics, Grade 7
41 TEKS Total

PUBLISHER Addison Wesley Longman, Inc

TITLE OF PROGRAM Connected Mathematics Program

GRADE 7

SUBMITTED FOR CONFORMING LIST? Yes

PRELIMINARY RECOMMENDATION Nonconforming (19)

A number in parentheses after the recommendation indicates elements of essential knowledge and skills (TEKS) not addressed.

Key to Attachment

Program	Reviewers	TEKS	No/Yes	Majority Rule	Number of TEKS Not Addressed	Status
	2	3	4	5	6	7

1. *Program title*
2. *Number of State Textbook Review Panel members who reviewed the program*
3. *TEKS about which panel members had differing conclusions or that all agreed were not addressed*
4. *Number of how many said no or yes*
5. *Preliminary determination (by consensus or majority rule) of whether or not a TEKS element is addressed.**
6. *Total number of TEKS determined to be not addressed or needing documentation*
7. *Preliminary recommendation*

*Methodology for preliminary determination

All yes	=	(Y) Yes
Majority yes	=	(Y) Yes
Split decision	=	(RD) Request Documentation
Majority no, but any yes	=	(RD) Request Documentation
All no	=	(N) Not Addressed

Please refer to the Commissioner's letter for options available to publishers for response to this report. Questions and comments about this report should be directed to

Dr. Robert H. Lees
Senior Director
Textbook Administration
Texas Education Agency
1701 North Congress Avenue
Austin, TX 78701-1494
Phone: (512) 463-9601
Fax: (512) 463-8728

The TEA review has determined that Connected Math does not conform to the state-mandated standards for teaching math in middle school (TEKS). This is the full report for sixth grade.

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Commissioner's Preliminary Recommendations Regarding Instructional Materials Submitted for Adoption Under Proclamation 1996 September 15, 1998

Mathematics, Grade 6
37 TEKS Total

PUBLISHER: Addison Wesley Longman, Inc.
TITLE OF PROGRAM: Connected Mathematics Program
GRADE: 6
SUBMITTED FOR CONFORMING LIST? Yes
PRELIMINARY RECOMMENDATION: Nonconforming (14)

A number in parentheses after the recommendation indicates elements or essential knowledge and skills (TEKS) not addressed

Key to Attachment

Program 1	Reviewers 2	TEKS 3	No/Yes 4	Majority Rule 5	Number of TEKS Not Addressed 6	Status 7

1. *Program title.*
2. *Number of State Textbook Review Panel members who reviewed the program.*
3. *TEKS about which panel members had differing conclusions or that all agreed were not addressed.*
4. *Number of how many said no or yes.*
5. *Preliminary determination (by consensus or majority rule) of whether or not a TEKS element is addressed.**
6. *Total number of TEKS determined to be not addressed or needing documentation.*
7. *Preliminary recommendation.*

*Methodology for preliminary determination:

All yes	=	(Y) Yes
Majority yes	=	(Y) Yes
Split decision	=	(RD) Request Documentation
Majority no, but any yes	=	(RD) Request Documentation
All no	=	(N) Not Addressed

Please refer to the Commissioner's letter for options available to publishers for response to this report. Questions and comments about this report should be directed to:

Dr. Robert H. Leos
Senior Director
Textbook Administration

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Teamwork for Excellence

PLANO
Independent School District

Administration Building
2700 W. 15th Street
Plano, Texas 75075-7543

(214) 519-8100

May 21, 1999

Dear Parent,

Many of you received a recent mailing from some individuals regarding our middle school math program and "Connected Math." This mailing contains many inaccuracies in the reporting of the program, its implementation and its effectiveness.

Following Keith Sockwell, Deputy Superintendent's unscheduled appearance and questioning before the House Committee on Education, he returned to the district and revisited the concerns raised before the committee with our staff, including whether or not an alternative course should be offered. After this review, we are more convinced than ever that the Plano ISD math curriculum is a quality one and is in full compliance with all state rules.

We have endeavored to construct a meaningful and effective math program for our middle schools and I believe we have accomplished this goal. During the implementation of this program, we solicited input from parents, teachers and community business leaders to determine the needs of our students into the 21st Century and methodologies to effectively implement the math program.

The mailing that has been sent criticizing the program implies that the District failed to honor parental concerns and is teaching a curriculum that fails to meet the educational requirements of the State and the needs of our students. I have attached a copy of a recent letter from the Texas Education Agency responding to the allegations of those challenging our middle school math program and affirming the decisions of the District.

We hope this information clarifies many of the concerns that may have been raised. Please rest assured that the District is committed to providing a quality math program that will allow our children to excel in their future math classes and careers.

Sincerely,

Dr. Doug Otto
Superintendent

An Equal Opportunity Employer

TEXAS EDUCATION AGENCY
1701 North Congress Avenue • Austin, Texas 78701-1494 • 512/463-9734 • FAX 512/463-9838

Mike Moses
Commissioner of Education

May 10, 1999

Mr. William C. Bednar, Jr.
712 West 14th Street, Suite A
Austin, Texas 78701-1708

RE: Administrative Complaint of Kenneth Johnson, et al. regarding the Connected Mathematics Program at Plano ISD

Dear Mr. Bednar:

Complainants Kenneth Johnson, et al. assert that the Connected Mathematics Program for Grades 6, 7, and 8 in Plano ISD is educationally deficient and has violated state-mandated curriculum requirements both in concept and as actually implemented.

The following relief is sought in the complaint:

a) that the Commissioner of Education make an immediate, thorough and impartial compliance review and investigation to determine whether or not the CMP program, as implemented in the Plano ISD, is in violation of TEKS.

The Connected Mathematics Program was adopted by the State Board of Education in November 1998 in the Nonconforming Category. Adoption in this category means that the materials contain instructional material for less than 100% of the Texas Essential Knowledge and Skills (TEKS) but more than 50% of the TEKS. School districts may adopt materials from the nonconforming list, as authorized by TEC § 31.101(a)(1). Schools have the responsibility of teaching the TEKS regardless of materials adopted.

Staff from the Texas Education Agency requested that Plano ISD supply documentation about whether the TEKS for Grades 6, 7, and 8 Mathematics were addressed by the district. The district response included CMP/TEKS correlation documents developed by teachers involved in the CMP pilot program. The documents supplied by the district consist of the following:

- *"Correlation of CMP Units to Plano Mathematics Core Objectives (based on EE's),"*
- *"Correlation of 6th Grade CMP Units Taught in Plano to TEKS,"*
- *"Correlation of 7th Grade CMP Units Taught in Plano to TEKS,"*
- *"Texas Essential Knowledge and Skills for Middle School Mathematics Sixth Grade,"*
- *"Texas Essential Knowledge and Skills for Middle School Mathematics Seventh Grade,"*
- *"Texas Essential Knowledge and Skills for Middle School Mathematics Eighth Grade,"*
- *"Texas Essential Knowledge and Skills for Middle School Mathematics Algebra," and*
- *"Grade Levels Where 6th Grade Mathematics TEKS will be Covered in CMP,"*
- *"Grade Levels Where 7th Grade Mathematics TEKS will be Covered in CMP,"*
- *"Grade Levels Where 8th Grade Mathematics TEKS will be Covered in CMP."*

Dr. Jim Wohlgehagen met with Agency staff in Austin on April 14 and April 16 to discuss these documents and to answer questions regarding district implementation of the TEKS.

These documents indicate that the district has devoted a considerable amount of time and effort to ensure that teachers address the TEKS as they use the CMP materials. Based on this review, I find that Plano ISD has an adequate plan for teaching all of the TEKS.

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b) that pending those determinations regarding the CMP program, Plano ISD be directed (1) to discontinue the adoption of any CMP textbooks or materials; and (2) to discontinue all instruction in CMP and substitute a non-CMP math program that is in compliance with TEKS, or (3) in the alternative, to provide non-CMP math classes in compliance with TEKS in accordance with TEC § 26.003(3)(A), for parents and children who request them.

The finding in "a)" is that the CMP program as implemented in the Plano ISD is not in violation of the TEKS. Hence, the Plano ISD may continue implementing the CMP program as desired. TEC § 26.003(a)(3)(A), states that "a parent is entitled to request the addition of a specific academic class in the course of study of the parent's child in keeping with the required curriculum if sufficient interest is shown in the addition of the class to make it economically practical to offer the class." This law applies to the addition of a specific class, and does not address an instructional methodology used in the classroom. Plano ISD is offering mathematics classes for Grades 6, 7, and 8. This complaint is about the instructional materials used in those classes. The law also states in TEC § 26.003(b) that "the decision of the board of trustees concerning a request described by this Subsection is final and may not be appealed."

Julius Gordon, Director of the Division of Complaints, has a copy of this letter. Please direct any procedural questions to Mr. Gordon at (512) 463-9290.

Sincerely,

David D. Anderson
Coordinator, Curriculum and Professional Development

cc: Mr. Kenneth Johnson, Complainant
Dr. Ann Smisko, Associate Commissioner, Texas Education Agency
Mr. Julius Gordon, Division of Complaints, Texas Education Agency
Dr. Douglas W. Otto, Superintendent, Plano ISD

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PLANO STAR COURIER

Publication date - Friday, Apr. 2, 1999

PISD says 'No' to alternative math program

By KELLI CONLAN
Staff writer

Despite the hope of some parents, Plano Independent School District officials say there will be no alternative middle school math program next year for those who object to connected math.

Deputy superintendent Keith Sockwell, speaking at a Texas House Education Committee hearing Tuesday, said if enough students at a certain grade level at a certain school wanted an alternative, it could happen.

What he didn't say was that it would happen.

"I didn't mean to imply we would go back and offer an alternative," he said Thursday.

The hearing was being conducted to address House Bill 3396, a parental rights act. Six parents from Plano testified in support of the bill, citing their experiences in fighting the approval of connected math by the Plano school board. Sockwell walked in on the middle of the hearing and was called by committee chairman Paul Sadler to answer what Sockwell called "what-if" questions.

"And when you ask hypothetical questions," he said, "you'll get hypothetical answers."

What parents took away from the hearing, though, was something altogether different, said Kenneth Johnson, who was one of the parents who spoke.

"If parents (make) reasonable requests, I think the (House) committee intends for the districts to grant them," he said. "What I took out of the meeting Tuesday was that our request is reasonable."

Superintendent Doug Otto says the school board voted to adopt the connected math textbooks to be part of the math curriculum, end of story.

"The board has acted," he said Thursday. "They didn't adopt a connected math curriculum -- the curriculum hasn't even been written yet."

Johnson plans to appeal the board's textbook decision to the Texas Education Agency. A complaint filed with the agency last month already is moving forward.

"Part of our whole complaint has been about parental rights -- a parent's right to be involved in their child's education -- because we did not have a say," he said.

District officials maintain there was plenty of time for input, including two board meetings in the month of March, meetings at the middle schools before the pilot program started and town hall meetings.

Otto said he is confident his staff and the school board did a good job in informing the public and gathering comments. And, he said, the recommendation to adopt the textbooks came from teachers in the district, not administrators or school board members.

"The district has been portrayed as having not listened, not cared," he said. "Nothing is further from the truth. There were many opportunities for us to listen."

Contact staff writer Kelli Conlan at 972-424-4585, Ext. 265, or by e-mail at kelli_conlan@hotmail.com.

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Attention Parents

If you have a child entering 6th, 7th or 8th grade next fall, this concerns you.

It's the law .....You have a choice

The PISD School Board recently voted to adopt the controversial Connected Mathematics Project textbooks for implementatio in all Middle Schools in the Fall of 1999. When these textbooks were reviewed for compliance to the Texas Essential Knowledge and Skills elements (TEKS) by the Texas Education Agency, they failed to address an average of 47.5% of those elements at each individual grade level. The teaching of Connected Math is characterized by:

- group discovery of mathematical concepts with an emphasis on problem solving, communication, reasoning and connections (the National Council of Teachers of Mathematics goals)
- an emphasis on student-directed learning (the student learns what he is interested in learning)
- cooperative instruction (students teach each other)
- teachers function as facilitators (as opposed to direct instruction)
- a dependence on calculators (students access information instead of acquiring basic facts and skills)
- a focus on applied learning, AT THE EXPENSE OF CONTENT AND KNOWLEDGE-BASED LEARNING

The Texas Education Code section 26.003 states: Rights Concerning Academic Programs "A parent is entitled to request, with the expectation that the request will not be unreasonably denied, the addition of a specific academic class in the course of study of the parent's child in keeping with the required curriculum if sufficient interest is shown in the addition of the class to make it economically practical to offer the class."

In sworn testimony before the House Public Education Committee on March 30, 1999, PISD Deputy Superintendent Keith Sockwell said of the math controversy in Plano, "If we need to re-look at it, we certainly are very willing to do this." Representative Hochberg commented, "It has continued to amaze me that the concept of customer service doesn't seem to have ever sunk into enterprises like school boards in general." In addition, Representative Grusendorf questioned Mr. Sockwell regarding parent rights in section 26.003 of the Texas Education Code, "And I think it was some of our intent when we passed this statute that the parents would have this right. And it says, 'shall not be unreasonably denied'. So, the question is, do these parents have that right--even though you may disagree with them?" Mr. Sockwell replied, "If that is certainly the interpretation, you know, if we have not interpreted that properly, certainly they may have that right."

Connected Math is in its third year of experimentation at Armstrong, Wilson, Haggard and Bowman Middle Schools. The following information is from the CMP website at http://www.math.msu.edu/cmp/index.html. "The curriculum is organized around appealing and engaging problems. In solving these problems, students observe and generalize patterns and relationships, a process vital to acquiring a solid understanding of mathematical ideas. Connected Mathematics consists of units - each developed around a series of investigations - which emphasize a major concept or cluster of concepts. Students count, visualize, compare, measure, model, reason, play and use tools to explore mathematics. Problems based on real contexts, familiar and fun settings or interesting situations engage students' interest. Investigations use calculators, software and manipulatives such as angle rulers, square color tiles, number cubes and Connected Mathematics ShapeSets and Polystrips kits." Furthermore, on the same website, the developers of CMP also added, "Because the curriculum does not emphasize arithmetic computations done by hand, some CMP students may not do as well on parts of standardized tests assessing computational skills as students in classes that spend most of their time on practicing such skills."

PISD has decided a change is needed at the middle school level to improve scores on the end-of-course algebra exams. There is absolutely no evidence that Connected Math will help Plano students do that since the students participating in the

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pilot, in many cases unwillingly, have not yet taken the End of Course Algebra exam. There are no test results to back up this claim. In addition, evidence from programs similar to Connected Math used in California have failed to demonstrate the effectiveness of this reform mathematics philosophy.

According to information released by the Texas Education Agency, ***out of more than 1000 school districts in Texas only 8 adopted the Connected Math Project.*** Being the only other large district to adopt CMP, Austin ISD's Middle School Textbook Advisory Committee recommended a split adoption, choosing CMP and another textbook (Glencoe/McGraw Hill Applications and Connections) from the current adoption list to supplement Connected Math. El Paso ISD is also supplementing CMP by adopting the current Glencoe/McGraw Hill series of books in addition to CMP. Plano is planning to use a supplementary textbook that will be over eight years old.

FREQUENTLY ASKED QUESTIONS

PISD says CMP is a good program so why should I consider an alternative?

This new method of teaching math has not shown significant positive impact on student achievement. The only measurement that PISD has chosen to use is the TAAS, which is a minimum skills test. We do not know how this program will affect student achievement in Algebra. Connected Math does not cover 47.5% of the state mandated TEKS and will need to be heavily supplemented. However, the pilot schools have shown that it is nearly impossible to complete all of the planned modules, much less leave time for supplementary teaching.

Won't this mean that more teachers will be needed?

No. It simply means that the students requesting an alternative will be grouped together and one or more CMP classes will be replaced. Teachers will be assigned to teach the alternative, just as they are to honors and algebra classes.

PISD says the curriculum determines what is taught, not the textbook. So will there really be a difference?

This seems more an exercise in semantics rather than a description of what really happens in the classroom. The textbook drives the curriculum. In addition, the teaching methodology (group discovery learning) and the use of group work to determine some grades is very different from a "traditionally" taught classroom.

Won't a "traditional" program be characterized by memorization and rote learning?

The Glencoe series of books does include many hands-on activities to reinforce what is being learned. There is an emphasis on basic skills and there is practice to promote mastery. However, the hands-on activities can be looked at as the supplement to basic skills, as opposed to the basic skills being the supplement to hands-on activities, as might be said of CMP.

What if my child is on the honors track? Will the alternative class put them behind?

The mathematical content of the on-level Glencoe textbook exceeds what the CMP classes have been able to accomplish in the pilot schools. Due to the time-consuming nature of CMP, some classes completed only 4 of the 8 modules at a given grade level. Three years using the Glencoe series will probably better prepare students to use the Glencoe Algebra I textbook for 9th grade than 3 years of CMP. At some campuses there is a difference between 8th grade Honors and 8th grade Algebra I. We suggest verifying with your child's teacher specifically the class they will be placed in.

What if my child has already been recommended for Algebra I in the 8th grade?

This class will use the 9th grade Glencoe Algebra I textbook. Your child will not be taking any CMP modules. You will not need an additional alternative, you already have a traditional book. However, if your child has had 2 years of CMP, expect your child to go through a re-entry period in re-adjusting to a traditional course.

Didn't all the middle school teachers support this program?

In fact, the math teachers at 3 of our middle schools voted against this program. In addition, there has never been a full accounting of the actual votes individually for or against CMP. A simple majority of teachers at a given middle school was required to determine the vote one way or the other.

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It's the law....you have a choice.

If you want an alternative math class, using the Mathematics: Applications and Connections and Pre-Algebra textbooks published by Glencoe/McGraw Hill, sign this petition. These are highly rated textbooks and have been adopted in many of our neighboring districts. They were found to conform to all the required Texas Essential Knowledge and Skills elements when evaluated by the Texas Education Agency. The books use traditional instruction methods and have been found to have a high level of mathematical content. They are also part of the series of books that leads up to the Glencoe Algebra I textbook currently being used in 9th grade. By requesting this alternative, you are not asking for another class/teacher to be added. You are asking that a CMP class be replaced by the alternative you are requesting. Therefore, there is no economic impact to the district.

For more information call Ronni Jenkins 972-423-3092 e-mail steve.tjenkins@gte.net, Timothy Soh 972-491-7859 e-mail Tim_Soh@hotmail.com or Sue Sarhady 972-491-0203 e-mail ssa857@airmail.net

See our website at http://cmpinpiad.freeservers.com

PETITION FOR ALTERNATIVE MATH CLASS

This petition is for the addition of a specific academic class in the course of study of math for the parent or guardian's child named (print full name)_____that is entering _____th grade in the Fall of 1999 at _____Middle School. I am requesting that the following conforming textbook be used as the primary instructional resource and that the course be taught at the middle school my child will be attending (check grade level your child will be entering):

_____6th grade .....Glencoe/McGraw-Hill Division, Mathematics: Applications and Connections, Course 1, Texas Edition.

_____7th grade.....Glencoe/McGraw-Hill Division, Mathematics: Glencoe Pre-Algebra: An Integrated Transition to Algebra and Geometry, Texas Edition, 7th grade.

_____8th grade.....Glencoe/McGraw-Hill Division, Mathematics: Glencoe Pre-Algebra: An Integrated Transition to Algebra and Geometry, Texas Edition, 8th grade.

Your Printed name _____

Printed Street Address, City, State, Zip _____

Phone _____

e-mail (join our mailing list) _____

Signature _____ Date _____

_____I would agree to purchase the required textbook, if necessary (approx. cost about $40) so there will be no economic impact to the district. (If there is no economic impact to the district, the district may be more inclined to offer the choice.)

Please mail your signed petition to MATH CHOICE, c/o 3689 Glover, Plano TX 75074-4624.

These petitions will be tabulated by school and grade level and presented to the Plano Independent School District for the addition of the requested class/es. Enough students at each school and grade level will need to request this alternative for it to be considered economically feasible.

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California Department of Education

1997 Follow-up Adoption of
Basic Instructional Resources in Mathematics

Final Adoption Report

Adopted by the State Board of Education

Note: Materials adopted in this document may be purchased only with instructional materials funds and not with funds in 1998-99 Budget Act item 6110-150-0001.

California Department of Education
Sacramento, 1998

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Follow-up Adoption Process for 1997

Summary of Adoption Actions

Programs Adopted

Encyclopaedia Britannica
Mathematics in Context (Grades 5-7)

Everyday Learning
Everyday Mathematics (Grades 1, 2, 4, and 5)

Kendall/Hunt
Math Trailblazers: A Mathematical Journey Using Science and Language Arts (Grades K-3)

Prentice Hall
Prentice Hall Middle Grades Math: Tools for Success (Grades 6-8)

Programs Not Adopted

Dale Seymour
Investigations in Number, Data, and Space (Grades 1, 2, and 5)
Connected Mathematics (Grades 6-7)

Acknowledgments

PLANO
Independent School District
Framework for Excellence

May 11, 1999

Ms. Ronni Jenkins
3809 Glover Drive
Plano, TX 75074

RE: E-mail to Marilyn Brooks dated May 7, 1999

Dear Ms. Jenkins,

It is my belief that we have already addressed the issue of Connected Math referenced in your e-mail. Following my unexpected appearance before the House Committee on Education, we reevaluated both our interpretation of Chapter 26 and the "interest" in alternative methodologies to our middle school math program.

A recent letter from the Texas Education Agency (TEA), we believe, supports both our interpretation of Chapter 26 and our effort to provide a quality and effective middle school math program. For your benefit, I have attached a copy of the letter from TEA. After reviewing our program and the receipt of TEA's letter, we find no evidence to change our previous position with regard to Connected Math.

Because this issue has been raised fully to the Board of Trustees, as provided in Chapter 26, that decision is final. Accordingly, there appears to be no need for any further meetings regarding this issue.

Sincerely,

Keith Sockwell
Deputy Superintendent

Cc: Rep. Paul Sadler
John Muns
Dr. Doug Otto
Marilyn Brooks
William Bednar, Jr.

Michael Woods/Staff photo

Thomas Stack [illegible] presents a petition to the Plano school board Tuesday. The parents who signed the petition are concerned about the district's [illegible] is headed in the right direction at all PISD [illegible]

Petition targets connected math

Parents object to curriculum

By JONATHAN M. BELL
Staff writer

Attorneys representing [illegible] Plano public school students who are dissatisfied with the district's new connected math curriculum presented a petition with more than 500 hundred signatures to the school board Tuesday. The parents are asking the school board to offer alternative math classes for their children.

Connected math is a controversial new math teaching methodology that emphasizes real-world applications of mathematical concepts rather than the concepts themselves.

Trustee Alan Bird took exception to statements by Texas Justice Foundation lawyers Thomas Stack and Alan Parker that indicated the parents had the right to request different classes under state law. He also objected when they said they had a letter from Texas Education Agency commissioner Mike Moses supporting the association.

Turn to MATH, Page 4A

Math

From 1A

[illegible] letter from the TEA [illegible] supports the (Plano school) board's position," Bird said.

Board president John Muns, responding to Parker and Stack's requests for a further hearing on the subject, declared the issue closed.

"We will not have any more public hearings on this matter," he said.

However, parents involved in the organization created to oppose the adoption of connected math as a curriculum vow to continue their fight.

Math Choice co-founder Ronna Jenkins said the next step for parents opposed to connected math will be litigation.

"We are working with the Texas Justice Foundation on some parental rights violation," she said. "We'll be pursuing parental rights violations in court, more than likely federal.

"We have a smorgasbord of civil rights violations to choose from," she said.

Jenkins said the district could have avoided the difficulties connected math has presented.

"If they had done the right thing a year ago, we would not be at this place," she said. "We have told them from day one that we are not going to let go."

Marilyn Brooks, [illegible] superintendent for curriculum and instruction, said the best curriculum has been designed for Plano students.

"We have to do more than just give kids formulas and then have them fill out worksheets or do problems," she said. "They must learn to use their mathematics, and that is what this is all about."

Brooks defended the process by which connected math was chosen and implemented for Plano classrooms. "Who chooses? Who makes the decisions for the 10,000 students in the classroom?" she said.

"The board ultimately chooses the textbook, and they choose that based on the recommendation of their professionals. Our school board has been very good. I think they believe that they hire good people and they've tended to trust their professional opinion."

[illegible] 972-424-4585 Ext. 1705, or by e-mail at jonathan_m_bell@dallasnews.com.

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PLANO STAR COURIER

Home | Latest News Stories

Publication date - Wednesday, August 25, 1999

Parents to file lawsuit today against PISD

- **Organizers claim the district ignored their right to offer input into their children's education**

By JONATHAN M. BELL
Staff writer
Parents of Plano students will file a class action lawsuit today claiming the Plano Independent School District ignored their fundamental right to have direct input in the education of their children.

The lawsuit stems from a year-long struggle over connected math, a new middle school math curriculum.

Concerned parents formed the organization Math Choice initially to oppose the adoption of connected math as the standard PISD middle school math curriculum and to preserve the traditional math teaching methods.

Once connected math was adopted by PISD trustees, Math Choice shifted its focus to trying to convince the district to provide traditional math courses as an alternative for their children. The lawsuit is the latest attempt to force the district to provide such classes.

The Texas Justice Foundation will file the lawsuit in federal district court in Sherman on behalf of six parents. The foundation expects 500 or more parents to join the lawsuit after it is filed.

The initial six parents are Celia J. Chiu, Denise Brown, Veronica Jenkins, Denise Kirke, Alfred Kirke and Kenneth Johnson.

Foundation lawyer Thomas Stack said the lawsuit will demonstrate that PISD has an obligation to recognize the educational desires of the parents of its students.

"The debate is no longer solely the curriculum -- should we have it or not," Stack said. "The debate now is parental rights. It's over the right of parents to request with reasonable expectation that it's not going to be denied the addition of a specific class."

A "request with reasonable expectation that it is not going to be denied" is a reference to the language in the Texas Education Code, Section 26.003(a)(3)(A), which states parents can request classes be offered if they are in keeping with the required curriculum, if sufficient interest is shown and if it is economically practical.

Former Texas Education Agency commissioner Mike Moses ruled that section did not apply in the specific case of connected math in Plano.

Stack insists that it does apply.

"We have a very different opinion as to the effect and validity of that statute in this situation," he said. "The district violated the fundamental right of parents to direct the education of their children."

In addition to issues of educational choice for parents, the lawsuit will allege that individual parents' rights were abridged by the district during the ongoing conflict over connected math.

"We've sued the district, and we've sued all the individual board members as well for violations of free speech," Stack said. "Mr. Kirke and Mr. Johnson were specifically forbidden from distributing literature at public meetings, and that is a violation of free speech. Veronica Jenkins was told she could not have a position on a parents' committee simply because of her perceived agenda on the math program."

A lesser claim in the lawsuit concerns the experimental nature of the connected math curriculum.

"There are some in the math profession who believe that this connected math program is what's called an experimental program and that basically these children have been human subjects in an experimental program without parental consent," Stack said. "That's not a big claim, but it's still part of the lawsuit."

PISD officials would not comment on the lawsuit Tuesday because it had not yet been filed and they had no chance to review it.

Johnson, one of the initial plaintiffs, is upset both because he feels parents are not being given the right to choose their children's education and because his own freedom of speech was impinged upon during the process of choosing the curriculum.

"At one of the parents' math nights, I handed out to parents the TEA evaluation of the (connected math) textbook," Johnson said. "As I was handing it out, one of the principals got in my face and ordered me off the property. It was the closest I feel I've come to being hit."

Johnson did not leave the meeting but did stop handing out the information, he said.

"Parents needed to know the public information about the curriculum," he said. "I have a huge problem with that."

Johnson stressed that the lawsuit is not focused on discontinuing connected math in Plano.

"One of the things we're all believers in is local control," he said. However, "local control in Plano does not include parents."

The Texas Justice Foundation will have a news conference at 1 p.m. today in front of Haggard Middle School to announce the lawsuit.

Parents in PISD who want to join the lawsuit may contact the foundation at 210-614-7157.

Contact staff writer Jonathan M. Bell at 972-424-4585, Ext. 1265, or by e-mail at jonathan_m_bell@hotmail.com.

HAWK TALE NEWS

Extreme News

The sixth graders on team 3 have just completed an interesting study of the respiratory and circulatory systems. This was a very stimulating and "up-beat" unit for all. Most of the students should still remember the path blood takes as it flows through the heart, lungs, and body. Just ask them to sing you a few lines. We are moving to the endocrine and nervous systems next and wrapping up the semester with research on the Internet of various diseases of the body.

Mrs. Stone's English class will be writing descriptive papers the 3rd 6 weeks. Students will hone their ability to paint pictures with words. Other units of study will include a friendly letter, spelling, vocabulary, and verbs.

An in depth study of Traditional Literature was completed in Reading class. It was discovered that there are many different versions of the story "Beauty and The Beast." The students followed a story about a man named Jack to three different countries. We will complete the semester by working on individual reading skills, such as main idea, summarization, and Fact and Opinion.

The Extreme Team Social Studies classes have just finished studying the ancient civilization of Mesopotamia. They actually created their own cuneiform tablets from clay as mementos of this unit of study. Currently, we are delving into the ancient Egyptian culture and their impact that their ideas have on us today. After Thanksgiving, we started the two other ancient river civilizations of India and China - the Indus River Valley and the Yellow River Valley.

Team 1 News

Math - As we enter the end of the first semester, students in traditional math are really enjoying their exploration of fractions in Bits and Pieces I. Advanced Math is extending probability into personal experiences by correlating real-life situations into fractions, decimals, and percents. The entire sixth grade is participating in "Raising the Hawk" by selling candy after school. This activity has blended well with our C.M.P. series by offering real-life/hands-on activities. To evaluate and improve our students' basic computation skills, we are developing a series of timed diagnostic tests. To enhance this series, we will offer daily computer lab reinforcement from 8:00 a.m. to 8:25 a.m. We would like parent volunteers to act as monitors in the lab. (This allows our math teachers to continue with morning tutorials of current content.) Any parents interested in volunteering should contact their child's math teacher: Barbara Ball at x35051; Ron Minkow at 35152; and Teresa Bates at x35150.

Science - Miss Mosby's science classes have been busy studying about the body systems. During Red Ribbon Week the students discussed many harmful aspects of drugs and alcohol. This unit correlated well with the respiratory system and anti-smoking lessons. The next body system studied will be the circulatory system. Any students needing extra help with this unit may attend science tutorials on Thursdays after school, or they may make an appointment to meet on another day.

Reading - Students are getting ready to study the elements of fictional stories, such as plot, setting, characterization, and problems, including the kinds of conflicts found in literature. All this will lead up to a unit on traditional literature and a class novel. Continue to see that your child reads every night as part of their everyday study habits. This is the only homework they have for Reading class.

Social Studies - Team I students have been exploring the people of the Fertile Crescent in Southwest Asia. Students gained a greater understanding of the lifeways they developed and the civilizations they built in Mesopotamia, their conflicts with each other, and their creation of empires. They concluded the unit with a **Picture Gallery Summarization**. In the next unit, students will begin the study of Ancient Egypt, starting with the importance of the Nile. Students will learn what a myth is and how ancient Egyptians balanced continuity and change to maintain their civilizations. The six-weeks will end with students examining ways the Nubians and the Egyptians influenced each other.

English - Mrs. Murray's classes have recently completed units of study on nouns and the principals of sentence mechanics. They used these skills to compose original songs and poetry which they entered in the Drug Awareness Program's **Drug Busters**. All eyes and ears are waiting to see who the winning entrants are! After studying the correct form for a friendly letter, students wrote to friends or loved ones they have not seen in some time. They are anxiously awaiting their anticipated replies. This six weeks is a very busy one indeed! Students are studying verbs in great detail in a unit Mrs. Murray refers to as "Everything You Always Wanted to Know About Verbs But Were Afraid to Ask!" In addition, they will learn the key steps used in writing about comparison/contrast issues. Finally, students will embark on a six-month journey to record their life story in an autobiography. In it they will also record their personal observations of certain meaningful events in their life and they will design and make their own cover. It should prove to be a very rewarding experience for all!

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(21) HANDED OUT AFTER CARPENTER'S MATH MEETING

FOR RELEASE:
October 6, 1999

Contact:
David Thomas
(202) 401-1579

EXPERT PANEL SELECTS EXEMPLARY, PROMISING MATHEMATICS PROGRAMS

Assistant Education Secretary Kent McGuire announced today the selection of 10 mathematics education programs as exemplary and promising. The K-12 programs were chosen for their outstanding quality and demonstrated effectiveness, following a national search.

Five of the programs were designated "exemplary" because they provided convincing evidence of their effectiveness in multiple sites with multiple populations. Five were designated "promising" based on preliminary evidence of effectiveness in one or more sites. The 10 programs were selected from 61 programs voluntarily submitted by the developers or publishers of the program. Four of the 61 programs need further review.

"The exemplary programs have met the highest standards set by our nation's leading mathematics experts and educators," McGuire said. "These programs work, and we encourage teachers, administrators, and policymakers to learn more about them as potential additions to their curriculum. The promising programs have great potential and strong but preliminary evidence that they too can serve our students well."

The search for quality mathematics programs began in 1994 when Congress directed the department's Office of Educational Research and Improvement to establish "panels of appropriate qualified experts and practitioners" to evaluate educational programs and recommend the best to the secretary of education. The Expert Panel in Mathematics and Science is comprised of 15 mathematicians, scientists, educators, and policymakers from around the country.

The expert panel began its search by assessing the status of mathematics education in the U.S. Their study showed that 43 states have adopted or substantially incorporated recommendations from the national standards documents into their own standards and curriculum frameworks.

The panel also found that educators are seeking curriculum materials and programs that translate the standards into a useful form for their classrooms. Consequently, the panel decided to focus its first year's search on programs that exemplify the standards set by the National Council of Teachers of Mathematics and the American Association for the Advancement of Science benchmarks.

The selection process encouraged applications from any program that would meet the review criteria and 61 programs applied for voluntary review. Nearly 100 experts were involved in the review process. First, submissions were evaluated by field-based reviewers for program quality, usefulness to others, and educational significance. Evaluation experts then assessed the claims of effectiveness made by the developers of programs that received high ratings in the initial review. The full expert panel then reviewed all of the programs along with ratings and comments from the review teams.

Exemplary & Promising Mathematics programs provides additional information about the 10 programs identified for recognition in 1999. For copies of the publication, call 1-877-4ED-PUBS (1-877-433-7827). Full text of the publication is also available on the web at http://www.enc.org/ed/exemplary/.

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NOTE TO EDITORS: Brief descriptions and contacts for the 10 programs are attached.

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Volume XXVII, Number 10
October 13, 1999

district digest

Plano Independent School District — Staff Newsletter

Plano ISD United Way Campaign Underway

With the 1999 Plano ISD United Way Campaign underway, district employees have the opportunity to show support for the community by participating in the annual United Way Fund Drive which will be held through October 22. Last year, Plano ISD employees generously contributed $109,000 making Plano ISD's United Way drive the largest employee campaign in Collin County. This year, the district goal is $114,500. "Plano ISD employees continue to show their support of the community year after year," said Danny Modisette, interim central cluster area assistant superintendent. "This is a tremendous service that is important to our schools and community." Organizations that receive United Way funding in Collin County include:

- Children's Advocacy Center
- Boys & Girls Clubs
- CASA (Court Appointed Special Advocates)
- Care Center/Samaritan Inn
- Women's Shelter
- Committee on Aging
- CITY House (Runaway Youth Shelter)
- Information and Referral
- Rape Crisis Center
- South Collin County Infant Program
- Plano Instructional Preschool, Inc.
- Maurine Barnett Geriatric Wellness Center

Giving is a personal matter, and sometimes it is hard to decide what is an appropriate gift. Volunteers and working people suggest the following guidelines for making a contribution: .6% of annual income for those who earn up to $20,000; 1% for those who earn $20,000 to $29,000; 1.25% for those earning $30,000 to $74,900; and 1.5% for those earning $75,000 or more. Contributions can be made by cash, check or payroll deduction. Contribution forms are available in each school/department office and in the Personnel Department.

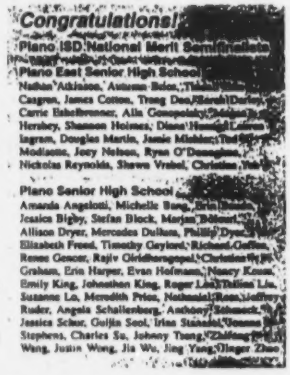
Fifty-nine Plano ISD Seniors Named Semifinalists in Year 2000 National Merit Scholarship Program

A record 59 Plano ISD high school seniors have earned Semifinalist standing in the year 2000 National Merit Scholarship Program. These academically talented young men and women have an opportunity to continue in the competition for approximately 7,600 Merit Scholarship awards, worth about $28 million, that will be offered next spring.

Nearly 1.2 million students in more than 20,000 U.S. high schools entered the year 2000 Merit Program as juniors by taking the 1998 Preliminary SAT/National Merit Scholarship Qualifying Test, which served as an initial screen of program entrants. Fewer than one percent of the nation's high school seniors were designated Semifinalists on a state representational basis.

To achieve Finalist standing, these Semifinalists must have an outstanding high school academic record, submit SAT scores that confirm their performance and complete a self-descriptive essay.

In addition to the National Merit Semifinalists, six Plano ISD students were recognized as Semifinalists in the National Achievement Scholarship Program which recognizes high achieving African-American seniors. These students include Kendre Henderson and Chauncey Shillow, Plano East Senior High School; and Renee Gencer, Jennifer Jones, James Pinckney and Andrea Smith, Plano Senior High School.



Mitchell Elementary Gifted Specialist and Plano Parent Capture Awards from State Gifted and Talented Association

Debbie Brunson, left, and Cynthia Graham, right, are recognized by the Texas Association for the Gifted and Talented by the association's director Lynda Walker, Plano ISD gifted programs coordinator (center).

The Texas Association for the Gifted and Talented (TAGT) named Plano ISD teacher Debbie Brunson the 1999 Outstanding Teacher and parent Cynthia Graham the 1999 Outstanding Parent for Region 10. These awards were presented in recognition of service, contribution and commitment to gifted education.

Ms. Brunson is the gifted specialist at Mitchell Elementary School. She has taught in Plano ISD since 1981 and has been involved with gifted education since 1984. She has served as a valued member of various curriculum writing committees, task forces, the Mitchell School Based Improvement Committee and with academic competitions.

Ms. Graham is the parent of two students who have attended Plano schools. She is currently president of the Plano Association for the Gifted and Talented, a parent group dedicated to promoting awareness of the unique social, emotional and intellectual needs of gifted and talented students and advocating appropriate educational services to meet these needs. She has also served on the Plano ISD Special Academic Services Advisory Committee, the PACE Task Force and the School Based Improvement Committees at Brinker Elementary and Renner Middle School. Plano ISD Gifted Programs Coordinator Lynda Walker presented plaques to Ms. Brunson and Ms. Graham recently at a special meeting at Mitchell Elementary. These two winners will also be honored at the TAGT annual conference awards ceremony.

Connected Mathematics Program Selected by Expert National Panel as 'Exemplary' for Quality and Effectiveness

The Connected Math Program was among five mathematics programs nationwide selected as "exemplary" by a national panel of experts for its outstanding quality and demonstrated effectiveness, following a national search by the United States Department of Education. According to U.S. Assistant Education Secretary Kent McGuire, the math programs were designated exemplary because they provided convincing evidence of their effectiveness in multiple sites with multiple populations. "The exemplary programs have met the highest standards set by our nation's leading mathematics experts and educators," said Mr. McGuire. "These programs work, and we encourage teachers, administrators and policy makers to learn more about them as potential additions to their curriculum." The national search for quality math programs began in 1994 when Congress directed the department's Office of Educational Research and Improvement to establish panels of appropriate qualified experts and practitioners to evaluate educational programs and recommend the best to the secretary of education. The 15-member Math Panel comprised mathematicians, scientists, educators and policy makers. The Plano ISD Board of Trustees adopted the Connected Math textbook to use in middle schools last spring.

Visit Plano ISD's web site to read the national press release and for more information about Connected Math. http://www.pisd.edu/SCI/math.htm

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PLANO STAR COURIER

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Publication date - Friday, October 22, 1999

Controversial math program scores exemplary rating

By JONATHAN M. BELL
Staff writer

Plano's embattled middle school math curriculum was bolstered recently by its inclusion with five other "exemplary" mathematics curricula from across the country.

The connected math curriculum was named an exemplary secondary math program by the U.S. Department of Education on the recommendation of a panel of national mathematics and education experts.

Connected math is a problem-centered curriculum designed to show students connections within mathematics, between mathematics and other subject areas, and to the real world.

The curriculum is at the center of a lawsuit filed by a group of parents of Plano middle school children dissatisfied with the program. Parents want the district to provide traditional math classes for students whose parents request them.

An expert panel chose the five exemplary programs based on evidence of their effectiveness in multiple sites with multiple populations, according to a press release from the Department of Education.

America Counts is a Department of Education math education initiative. Its director, Linda Rosen, spoke on behalf of the department about the process of choosing exemplary programs.

Rosen said that reviewers from throughout the United States were sought to examine the 61 programs that were chosen in a preliminary process as potentially excellent programs. Out of the 61, five were given the exemplary rating. "[The department] has identified a set of criteria that are very public and easy to find for judging these programs," she said.

Those criteria can be found at the department's website, www.ed.gov. There are eight criteria separated into four categories. Each criterion is further divided into indicators. In all, there are about 45 indicators.

Connected math was cited by the expert panel for a "broad array of student activities aligned with each goal [providing] students with appropriate and engaging opportunities for learning. The lessons are age-appropriate, and the sequencing of problem tasks within a unit, within a strand and within a grade level helps students progress toward a strong understanding of the five targeted areas of mathematics."

Timothy Soh, a prominent local critic of connected math, criticized the selection process itself. "Fuzzy standards begot fuzzy recommendations," he said. "The [National Council of Teachers of Mathematics] standards are used to evaluate math programs. Only [National Science Foundation] funded programs are tailored to those standards, so it does not surprise me that [the connected math program] is rated at the top."

On the other hand, Plano secondary math coordinator Jim Wolgehagen said he considers the selection of connected math a vindication of the district's choice to implement it. "It helps to validate the research that we had done and that the teachers had done," he said. "We were happy to see the recommendation that the department of education put out."

Contact staff writer Jonathan M. Bell at 972-424-4585, Ext. 1265, or by e-mail at jonathan_m_bell@hotmail.com.

NSF Award Abstract - #9250036

The Texas Science and Mathematics Renaissance

NSF Org ESR
Latest Amendment Date October 27, 1997
Award Number 9250036
Award Instr. Cooperative Agreement
Prgm Manager Linda S. Warner
ESR DIVISION OF EDUCATIONAL SYSTEM REFORM
EHR DIRECT FOR EDUCATION AND HUMAN RESOURCES
Start Date September 1, 1992
Expires September 30, 1998 (Estimated)
Expected Total Amt. $10,000,000 (Estimated)

Investigator Philip Uri Treisman uri@mail.utexas.edu
Linda L Cimusz
Sponsor U of Texas Austin
P O Box 7726
Austin, TX 787137726 512/471-6424

NSF Program 7360 STATEWIDE SYSTEMIC INITIATIVES
Fld Applictn 0000099 Other Applications NEC

Abstract

The Texas Science and Mathematics Renaissance is designed to reform science and mathematics education for all of its students by reforming curriculum and assessment through changes in teacher development. The project will develop Renaissance Centers that will house teams of master teachers, scientists and mathematicians, and higher education faculty to develop and implement a model of reform for preservice and inservice programs. The project has the following objectives:

1. Create a project governing board composed of the Governor's senior education aid, the dean of the College of Education at the University of Texas, Austin, the Commissioner of the Texas Education Agnecy and the Chair of the Commission on Higher Education;

2. Connect the Texas SSI to the state's ongoing reform work through the Committee for Student Learning;

3. Provide matheamtics and science expertise in the state's Education Service Centers (initially in regions 2, 4, 10, 18, and 20) to assist school-based centers in at least 20 middle schools (one for each region), provide support for improved mathematics and science education, and include institutions of higher education and communities in the effort. The Renaissance Centers will encourage site-based management, the use of a thematic, hands-on science curriculum, and performance- based assessment.

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4. Develop a process for adding other Education Service Centers and Renaissance Centers in years 2 - 5;

5. Reform preservice education in science, mathematics, and technology education through a competitive grant program operated by the University of Texas, Austin;

6. Extend the Texas Prefreshman Engineering Program at the University of Texas at San Antonio, to other areas of the state;

7. Conduct a program evaluation through Texas A & M and share results with the Committee on Student Learning; and

8. Work with the Texas Alliance for Science, Mathematics and Technology Education; Texas Buisness and Education Coalition; and the Texas Mathematics Education Coalition to institutionalize the Renaissance Centers after NSF funding.

You may also retrieve a text version of this abstract.

Please report errors in award information by writing to: award-abstracts-info@nsf.gov.

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The National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230, USA
Tel: 703-306-1234
FIRS: 800-877-8339 ~ TDD: 703-306-0090

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Addition to the Record
S. Sanhardy

Marilyn Keller Rittmeyer <mkr@nwu.edu>
303 East Hawthorne Street
Arlington Heights, Illinois 60004
(847) 253-1947 Evening Home Phone Number
Northwestern University School of Education Ph.D. Candidate
Public School Teacher for over 2 decades
Member National Education Association
Co-Founder of Thomas Jefferson Core Knowledge Charter School

This past fall, the U.S. Department of Education endorsed 10 experimental math programs as exemplary or promising. In response, a group of 200 heroic scientists and mathematicians placed a full-page newspaper ad condemning this recommendation as an intrusion on sound mathematical teaching. Though many Americans agree with the scientists/mathematicians, the executive director of the National Council of Teachers of Mathematics (NCTM) discredited these heroes as a "small, but vocal, minority." Even if they are a mincrity, a claim which is dubious, in America minorities do have rights.

The current dispute is about math, but such disputes have been ongoing for decades in American education, because there are generally two education camps, progressive and classical. People typically identify more closely with one philosophy or the other. When people of sound mind and good will differ in their views, what is demonstrated is the need for less tyranny and more choice.

For the past century, particularly in the last four decades, the American public educational system has followed the progressive model. Progressive math programs de-emphasize a sequential approach to the teaching of the skills of arithmetic and algebra in favor of group activity, projects, and calculators, whereas classical math emphasizes the systematic development of basic skills that is necessary to achieve mastery of more complex ideas. In the other academic disciplines, classicalists believe that breadth and depth of content and vocabulary is very important for each child's education, whereas progressivists believe that children learn best when the educational process is guided by children's interests. Textbooks and workbooks are more consistently used in all disciplines in classical schools; individual projects, group activities, and teacher-designed curricula are more predominant in progressive schools. Correct spelling and grammatical structure in writing is emphasized in classical schools; spelling, grammar, and composition books are inconsistently used in progressive schools. Structured phonics lessons are found in classical schools; whole language is used in progressive schools. Teachers in classical schools provide explicit direct instruction to their students, while teachers in progressive schools are "guides on the side, not sages on stage." Last of all, classicalists believe that regular standardized achievement and ability tests are important, whereas progressivists question the necessity or relevance of these tests.

Classicalists believe that progressivism is a questionable educational approach particularly for improving the achievement of at-risk youngsters. They believe that the gap in achievement between the races may be partially caused by inadequate progressivist materials and instructional techniques. Many at-risk children need structure and repetition, yet progressivists blaspheme classicalists as "drill and kill" sergeants who insist upon "rote memorization," insinuating that classicalists do not care if children understand what they are taught.

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Many teachers prefer classical education, but the decision-makers in American public education from the local level all the way up to the national level by and large believe that progressive, experimental education is right and classical education is wrong. Rarely does one find a classicalist in a position of leadership in American public education, and rarely are classicalists hired as professors in colleges of education.

No classical public schools exist in most communities. This injustice must be rectified.

With more open-mindedness and tolerance of diversity, public education can provide the type of education both classicalists and progressivists prefer. Just as executive directors of public libraries provide for the diverse reading preferences of their communities, school superintendents in their role as public servants should provide for the community's diverse educational preferences, whether classical or progressive.

I propose that for every two neighborhood schools, one would use progressive curriculum and instructional techniques and the other would be a classical school. Let neighborhood parents choose either of these two schools, both of which would be relatively close to their homes.

We have departed the progressive education era of the 1900's and have entered a new century and a new era in education. It is my hope that the U.S. Department of Education and every state and local board of education will recognize the merits of classical and progressive education. Offering parents in a pluralistic democracy the choice of classical or progressive education is a just and honorable and right thing to do for children and their parents, and for public education too.

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CALIFORNIA STATE UNIVERSITY, LOS ANGELES

5151 STATE UNIVERSITY DRIVE, LOS ANGELES, CA 90032

The Hon Bill Goodling, Chair
Committee on Education and the Workforce
U S House of Representatives

January 30, 2000

Communicated by Susan Sarhady

To the Committee,

Although I am familiar with some of the negative experiences that California schools have had with several of the curricula deemed "Exemplary" by the Expert Panel of the U S Department of Education, released in October of 1999, most especially IMP and CPM, I will confine my submission to the curriculum that has done the most damage here, a K-5 program called MathLand This curriculum was approved for purchase in California in 1994 and quickly rose to be the biggest seller of mathematics curricula in the state Now, a few years later, purchases are in virtual free-fall Not only was it not approved in the new evaluations of 1999, it was not even submitted for consideration The publisher, Creative Publications, knew that it had no chance for approval against the California Mathematics Content Standards that were established in December of 1997 In spite of the growing dissatisfaction across California, and almost a year after it was known that it was not being submitting for re-approval, MathLand was deemed "Promising" by this U S Panel That assessment is nothing short of outrageous

Since I had been trying to follow the supposed data put forth by Creative Publications in support of this curriculum since early summer of 1997, I sought to find what possible evidence the Panel was able to acquire to make its conclusion, tentative though the word "Promising" might be Rather surprisingly, the answer was **none**! Much of the **same** data for which I tried to obtain support in 1997 was presented to the Panel and not given even a superficial check for confirmation I know that for a fact because I pursued the question with the Office of Education Research & Improvement through an official Freedom of Information Act request, Tracking No OERI-2000-1805F, with response dated November 30, 1999 That response was 23 pages of evidence, in summary

Page

1	Summary of the pages which follow
2-10	"Because no control group was used " is a pretty good self-summary of this so-called data
11	Department of Defense (DoDDS release Sept 3, 1997) My impression is that the DoD dropped MathLand after falling scores across almost (if not all) racial and socioeconomic subgroups
12-17	Newspaper clippings from San Francisco and Santa Barbara newspapers
18	Creative Publication's interpretation of the SF numbers
19-23	The LA Unified situation on which I especially wish to focus

The Santa Barbara story from clippings that are **not** included (i e , one year earlier) is more interesting since they reported declines at nearly all of the elementary schools The following year, the district made a great effort to help schools compensate for MathLand so recovery from unadulterated MathLand is the record of the clippings, not MathLand itself Here are some details about that first full year

For the 10 schools adopting MathLand in Santa Barbara, 8 schools had lower CTBS scores one year after the adoption, one stayed the same, and one had increased scores. The one that increased included

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students in a large GATE program which used substantial additional resources and the principal insisted that teachers supplement with lots of skill practice The two schools with the highest levels of LEP students (Limited English Proficiency) had the greatest declines, Cleveland and Franklin went from above the 70th percentile in the early nineties to below the 30th by 1996 The district went from 8 out of 10 schools at or above the national average in 1994 to 7 out of 10 below the national average by 1996, the first full year of MathLand at all of the schools across the district

The situation about which I had the most direct information was that of pp 19-23, the six MathLand schools in LA Unified that was one of the "eight districts participating in MathLand's Assessment Consortium" referred to on P 48 of the "Exemplary & Promising Mathematics Programs" document of the Expert Panel By chance, I was able to locate one of those schools and the full standardized test data was very different from that reported in the FOIA package which is exactly the same information that was reported back in 1997 and that is still at the Creative Publication website, including the letter from the principal referred to in the attached

Roscoe Elementary was one of those six schools and the performance of 80% of the students at that school was deliberately omitted These were the most vulnerable students because of their LEP status and, despite the fact that the materials and the instruction were in their native language, their scores continued to fall rather precipitously while Creative Publications was - and still is - using that very school to promote its sales of MathLand across the country, quoting dramatically improved test scores and a personal letter from the principal, by then retired I am more than convinced that the average of the other five LAUSD schools would also indicate substantial **decline** in performance, not the implied increase of the report My intent through the FOIA request was to finally be able to get the names of these other five schools so that I could look at the real situation instead of the publisher's selective filtering Instead, the official report from the FOIA Officer, Maria-Theresa Cueva, stated, " they do not have information regarding item number two because this Agency [the Office of Education Research & Improvement] does not requires to submit that information from Public Schools " (The grammar and capitalization errors are part of Ms Cueva's report) In other words, they just passed along the publisher's highly misleading assessment

The U S Department of Education should not be a party to such chicanery A public retraction of this report and a dramatically different charge to the Expert Panels must be mandated immediately or all funding for this office must be terminated before any other report is issued Scientifically-based replicable data in education, that is worthy of making federal pronouncements of "exemplary" or "promising," is not easy to obtain Pretending that such has been part of the decision making process - when the actual data indicate the opposite - is nothing short of an abomination

Respectfully submitted,

Wayne Bishop, Ph D
Professor of Mathematics
California State University, LA
Los Angeles, CA 90032

(323)343-2159

Att The first of three letters to Creative Publications trying to obtain the names of the other five schools of the six LAUSD schools used in the Exemplary & Promising Mathematics Programs assessment

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CALIFORNIA STATE UNIVERSITY, LOS ANGELES

5151 STATE UNIVERSITY DRIVE, LOS ANGELES, CA 90032

William Jarrett, President
Creative Publications
1300 Villa Street
Mountain View, CA 94041

May 9, 1997

Dear Bill,

Thank you for sending the Grade 2 and Grade 4 MathLand materials for review and for the offer to come to Mountain View to meet you and view the *MathLand* operation first-hand. I have other questions that would need to be answered first, all originating from the *MathLand* promotion document labeled "For Immediate Release, April 10, 1997", and entitled "Review of Math Test Scores Indicates Improvement in California Elementary Schools Using New Curriculum." It claims that *MathLand* is "currently the most widely used math curriculum in California" so congratulations on your marketing success.

This eight page document apparently received wide school and press circulation and it summarizes results of scores "drawn from standardized tests of 30,000 students in eight California public schools districts". The results of this study "revealed that students are learning what they should be learning in basic math skills as they progress through each grade level" and the report concludes that, "this refutes earlier charges by critics claiming that the program was destined to fail. It shows we're on the right track and on our way to reversing the long trend of declining math scores in this state."

After looking at the actual second and fourth grade materials, I must admit that I would have come to a different conclusion, it would have been the same conclusion, in fact, as those unnamed critics. Since I am not a "data-proof ideologue", however, I hereby request the following:

1. Open access to the data base from which this data was sampled, at the very least, the names of the eight school districts involved.

2. The phone numbers or addresses needed to contact David Westmoreland and the other, unnamed, independent auditor who analyzed the results.

3. The phone number or address, or even just the school, needed to contact Catherine Au, "a Sacramento teacher for fifteen years", who attests to "dramatic improvements in my students" since she does not appear to be a teacher in the Sacramento Unified School District.

4. The source of the quote that *MathLand*, "has also been endorsed by the National Science Foundation" since it is my hope that the NSF is not in the business of making such endorsements, especially with no supporting data.

My suspicion - almost conviction, really - is that I will come to different conclusions about what is indicated in the data. This suspicion comes from looking at the *MathLand* materials directly,

from seeing the documented and serious decline in the Santa Barbara Unified School District, and from the last page of this promotion document itself. That is a letter from Ruth Bunyan, principal of Roscoe Elementary School, documenting dramatic increase in CTBS math scores from 1995 to 1996 and crediting "*MathLand* materials and instructional strategies" for part of their "significant difference during this past year". My thanks to Cindy Lopez for asking Ms Bunyan to contact me. She called and we had a nice chat on April 30. She has retired from LA Unified since her November 4, 1996, letter but I have also talked with both the current principal, Mary Kurzeka, and the *MathLand* coordinator mentioned by both principals, Ellen Morgan.

Not mentioned in Ms Bunyan's letter was the longer term CTBS history at Roscoe. Following the same class from first through fourth grades, we have 49, 44, 22, 44. That is, the first year of *MathLand* was a genuine disaster for these students but they somehow managed to recover and their recovery represents ALL of their progress. Even this data is misleading in that it is quite unrepresentative of the overall school performance. There were 27 fourth graders in the CTBS results at Roscoe in 1996, only 8 more the minimum that LA Unified requires to even report out the data. The letter makes quite a point of the fact that the school is "93% Hispanic with full bilingual classrooms in every grade." Given that situation at Roscoe, it seems strange that Ms Bunyan did not include the Aprenda results where 76 students were tested, nearly three times as many as were tested with the CTBS. Here are those results, also reported on a nationally normed percentile basis, and they are far closer to those "earlier charges that the program was destined to fail" than "reversing the long trend of declining math skills in this state."

	Grade 2 93-94	Grade 3 94-95	Grade 4 95-96
District Median	27	27	24
Roscoe Elem	32	23	15

If this is the kind of "progress" being seen in the Hispanic community, at least in the LEP portion of that population (879 of the 1096 students at Roscoe according to their Prop 98 Report Card) - even at the one school **featured** in *MathLand*'s promotion literature, a reasonable person should honestly wonder about the sampling techniques and data analysis used to study the data from the 30,000 students indicated on the other pages of this same promotion literature.

A common explanation given by apologists for the decline in student performance data sometimes seen in implementations of reform in education is the lack of teacher familiarity with the philosophy, the methods, or the materials of the reform effort. "If only we had money to train the teachers", is often heard. According to Ms Bunyan, that does not explain the precipitous decline in the Roscoe Aprenda numbers. She told me that she, with Ellen Morgan, were on the front edge of the wave, so to speak. Roscoe Elementary is a LEARN "Phase 1" school within LA Unified and received extensive assistance from Xerox Corporation. *MathLand* training from the company itself was provided on three different occasions. They made their decision for *MathLand* because it was "the finest curriculum we could find" and not from ignorance of the methods nor the materials. In fact, they changed from *Math Their Way*, curricula already far down the reform movement road, so the teachers had had a great deal of experience in guiding children through the constructivist activities of *MathLand* before they ever started the program. Even so, according to Ms Morgan, a lot of time and a lot of money was spent in training teachers, "real mathematics training" was the way she put it.

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There is another disturbing feature of the Roscoe situation that portends future problems unless immediate steps are taken to see that the anti-testing bias of some individuals in the public school environment are counteracted immediately The comparable year-by-year Aprenda data for the next class, those who were fifth graders last year, is 23, 15, *, with the * indicating that the data for their fifth grade year was not collected, i e , those students were not tested When I asked Ms Morgan about the fifth grade data, she told me that "We only test at the 4th grade because that's the only place we have to " In regard to the CTBS data that was reported, "We were not disturbed that the scores went up but that's not what we are looking for We put very little emphasis on CTBS scores " Even less, obviously, on Aprenda scores. It is appalling that these kinds of trends, both good and bad, that year-by-year standardized test data can indicate to parents and to policy makers, are being avoided within LA Unified, and perhaps statewide as well.

Sincerely,

Wayne Bishop
Mathematics & Comp Sci

(213)343-2159

Cc Cruz Bustamante, CA Assembly
Delaine Eastin, Supt, Dept of Ed
Mary Kurzeka, Principal, Roscoe El
Yvonne Larson, Pres, CA Bd of Ed
Bill Lockyer, CA Senate
Ruben Zacarias, Assist Supt, LAUSD

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BT
136 Mary Circle
North Mankato, MN 56003
Phone: 507 345-7150
FAX: 507 345-6142
email: bsaouse@yahoo.com

Sunday, January 23, 2000

House Committee on Education and the Workforce
Washington, DC

Dear Committee Members

Thank you for giving parents this opportunity to express their views on the Dept. of Education list of Exemplary and Promising Math Programs.

My son attends school in Independent School District #77 in Mankato, MN. Two years ago, the district began using the Connected Math and Core Plus math programs on the west side of town. This involved one middle school and one high school. The east side of town chose to continue using a "traditional" math program. Despite parental questions as to why one side of town decided to change and the other side did not, no response or explanation was provided. The students on the west side currently have no choice but to study math using the CMP and Core Plus math curriculum.

Fortunately, there is one other alternative that is available to some students and that is the Minnesota Youth Talented Math Program (MYTMP) which was developed along the guidelines provided by Johns Hopkins University for teaching math to talented math students. This is not part of the school district, draws students from many school districts in southern Minnesota and parents must pay tuition for their child to attend. The MYTMP alternative also means that students must pass an exam to be accepted into the program. Once accepted, they must attend a math class for two hours one evening a week and do 10-12 hours of homework for the following class. It is an intense, self-motivated class, with low teacher contact time and intense parental involvement.

My son has been in an accelerated math class since he was in second grade and has worked 1-2 years above grade level in his math class. When the Core Plus curriculum came to his school, he was in 7th grade. I was told by the principal that his accelerated math class would no longer be offered because the new curriculum was so rich and difficult that an accelerated class would no longer be needed. We knew that my son could choose to take the test for the MYTMP, but in late summer, before school began, he had no interest in attending that program.

When school started, he was placed in the "accelerated" Connected Math class, the prerequisite to Core Plus. Within one week, I watched a child who had loved math

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begin to hate math. On his own, without any prompting from me, he asked if he could take the test for the MYTMP program. This is the same child who two weeks before had stated emphatically that there was no way he would go to school at night for math. Now he was begging to do just that. To make a long story short, he was accepted into the MYTMP and he continues to attend this year. He is currently in 8th grade.

At the beginning of this year, we encouraged him to take the school Core Plus math class in addition to the MYTMP class, so that he could have the benefit of another math perspective. He agreed to give it a try, but after two weeks, he begged to drop the class. He stated "But mom, it's not even math!"

As for the MYTMP alternative, let me give you some interesting facts. Last year, the program had the largest number of 7th graders from the ISD #77 school district in 10 years. There were eight 7th graders in the program where in the past, the program might attract one or two. In addition, there were several students who wished to enroll in the program who either did not pass the test or who missed the deadline. This year, all the students from last year continued in the program, and even more 7th and 8th graders took the test and are participating in the program. There were some students who took the test, but did not pass, and my son told me some of them were literally crying with disappointment. All the students from ISD #77 who attend MYTMP are from the west side of town. (The schools that use CMP and Core Plus.) There are NONE from the east side. (These schools teach traditional math.)

The parents whose children attend MYTMP tell me that they do not really like having to send their children to an "after school" program to learn math, but they feel they have no alternative. They all agree that they do not think their kids will learn the math they need to know in order to be ready to study chemistry, physics and engineering, should they choose to do so, if they stay in the Core Plus math program.

I have attended the two meetings held by the middle school to explain these new programs and what I heard most parents saying is that their children are struggling and that the parents can not help them. The experts are telling parents that the way to help their children succeed in school is to be involved, yet the education establishment is forcing programs on the students that put parents in a position of being totally unable to help their child with homework. At these meetings, when the parents voiced their concerns about not understanding the new math program and not being able to help with homework, they were basically told not to even try to help their child, but to send the child to the teacher for help. Now tell me, is the teacher able to provide personal help to 150 students?

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I have a friend whose son is in Core Plus and his father spends many hours trying to decipher the material before he can begin to help his son. This man has a Masters Degree in Chemistry and he has difficulty helping his son. What about all the parents out there who do not have degrees in science?

In the past, traditional math programs may not have been successful in teaching all students math. However, the new programs developed to meet the standards of the National Council of Teachers of Mathematics are not reaching all students either. The ironic thing is that these programs are losing the top math students. Perhaps it is time to reconsider the process of teaching math and realize that more than one method may be needed depending on student abilities and educational goals.

There are no research findings that indicate that these new programs are going to teach anyone math. In fact, some research seems to be indicating that the top students who have been in these programs for the full three plus years are now finding themselves needing to take remedial math in college. It seems that students forced to learn math with these programs are experimental subjects whose parents have not given consent for them to participate in experimental research. The ethics of human research require informed consent. No one asked my permission or even provided appropriate information to me before my child was forced to participate in this math experiment. Fortunately, I had another choice. Others do not.

I could have used this letter to discuss the deficiencies of the CMP and Core Plus math programs but there are others more qualified than I who are able to do that. I just wanted to provide you with the story of one student's experience with one of the "Exemplary" math programs. Thank you for your time.

Sincerely,

Bess Tsaouse

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Patrick Regan
1513 Thames Dr.
Plano, Tx. 75075
972 423-2324

January 29, 2000

Dear Committee Members,

Why should the Department of Education withdraw their endorsement specifically of Connected Math, but also of MathLand, and other "Fuzzy Math" curricula now popular with the liberal education elite? Here are my top ten reasons:

1) In order to learn advanced math concepts, young students must first be well grounded in computational skills. Connected Math and its' brethren sacrifice this for the concept of making math fun. This is Middle School, not Senior High or College Math. Encouraging calculator use in sixth and seventh grade for all problems does not sharpen mental math skills useful later in real life. Teaching math concepts is every bit as essential as drilling to become adept at computational skill. In Connected Math however, the "pendulum" has swung too far away from developing computational math skills, and has become imbalanced in this regard for younger math students.
2) Connected Math leaves out many key algorithms (i.e. division of fractions) essential to later understanding of more advanced math concepts, and assumes children will "discover" such concepts as Pi and the Pythagorean Theorem on their own. Many in fact call this "discovery math". As math is "dumbed down" in public schools, colleges have had to add more and more sections of remedial math. A long list of distinguished mathematicians, scientists and mathematics educators have petitioned that the Department of Education withdraw their endorsement of these programs. They did not do this arbitrarily. (Since Connected Math was developed under the auspices of the NSF, I believe this endorsement to be more than a little self serving.)
3) I want my children to learn real math, not what I call "Math Appreciation". Making math fun does not necessarily mean that children are provided with the math skills they will need later in college, or in life. Writing essays on ones favorite number is not learning math, and uses valuable time that could be put to better use. Testing is de-emphasized, and subjective grading and group grades take more precedence. The right answer isn't important. (Maybe that's what happened to the recent Mars probe?) This makes it hard for parents to understand where our children are succeeding and where they may be failing in math, thus driving us further away from participation in our own children's education. (It also makes it easier for instructors to participate in "grade inflation").
4) Connected Math emphasizes group cooperation over individual achievement. It is educational socialism and subtly undermines the traditional American values of competition that have made this nation first among nations. This results in the smartest students teaching the others at the expense of their own advancement. Those most in need of instruction many times may not be really absorbing the concepts and are simply going along with a group solution in an effort to keep up while "hiding" in the group. This method also detracts from the strict discipline of the progressive logic of math as defined by the whole of Western civilization. While occasional group projects have a legitimate place in education, emphasis on objective grading and individual competition would reward those that achieve, and bring attention to those who need individual remedial assistance to progress. (We should be more concerned with measuring real learning than worrying about feelings).

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5) Teachers are downgraded to "facilitators". Traditional class lecture is dramatically de-emphasized even though many children thrive on traditional learning methods. Further, this course requires a lot of teacher training to even have a chance at success. This is an expense that our school district should not have to bear, especially when the teaching staff could be teaching effectively in a traditional mode with no further training. Further, the school district has apparently felt that it needed to hire at tax payer expense, an individual in the administration whose primary key task seems to be to promote Connected Math and deal with parents who have problems with it.
6) Connected Math apparently does not require that all of the course elements be covered in a school year. What kind of course is this? The course does not meet the TEKS (Texas Essential Knowledge & Skills) standards. Teachers are having to argue with parents that they are modifying and supplementing the curriculum in order to make the course effective. If this is so, then the course must logically be ineffective in and of itself.
7) Because we do not feel comfortable with what the schools are teaching our children, we feel we must heavily supplement this course with a lot of additional home instruction which would be unnecessary with a more traditional curriculum. This is a lot of extra work for our children and for the conscientious parents involved that shouldn't have to be happening. (The school district will take credit for the results of this effort however).
8) The Federal Government and its' various bureaucracies (i.e. Dept. of Education and the NSF) should not be dreaming up new liberal programs and pressuring or luring school districts to adopt them as experiments on our children. I fail to see in the Constitution where the Federal Government should be injecting itself so heavily in local school district curricula. Rather, the tenth amendment should be observed and the States and the People should be locally defining and implementing Public Education in America without so much "help" from the Federal Government using my tax dollars against me.
9) It is my understanding that according to Texas law, when a significant number of families in a school district make a reasonable request in writing that their children be afforded a choice of an alternative course option, that group should be allowed to have their program without implied threats that their children will not be allowed to participate in advanced and accelerated math programs later on. This is especially true when there would be no significant additional cost to the district for this. Petitions with over 600 names have requested this very thing locally, with the response from the school district simply being "No". Further, they have spent our tax money on campaigns to sell their program and denigrate those that oppose them.
10). The future of our children and thus our nation greatly depends their being able to compete by using both math skills and concepts fluidly. As we have adopted more Outcome Based Education (now frequently called "Standards Based") programs, American education is beginning to lag the rest of the world based on hard test results. I believe that well run traditional programs can positively impact and reverse this trend. I cannot by myself make a dent in what all of the school districts across America do. I know however that I am required to pay public school taxes and federal taxes whether my desires are observed or not. Consequently, I can simply ask my Government that my children, and the others who request it, be afforded the reasonable educational choices they require, need, and prefer in the Public Schools in order to succeed in life.

Sincerely,

Pat Regan

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Mrs. Cheryl Regan
1513 Thames Dr.
Plano, Tx. 75075

January 29, 2000

Dear Committee Members,

I am writing to you today to ask that you have the Department of Education withdraw its exemplary endorsement of the Connected Math Program and other progressive "fuzzy" math programs on its list. Our 6th grade son is actively involved with this math program this year. Thirteen years ago our now 24-year-old son was at the same middle school with the same instructor. Math was taught in a more traditional manner and our oldest son received an excellent education. He went on to graduate with honors with a degree in electrical engineering from college and then on to medical school. We know what is required to prepare children for higher education. We see our two younger children being experiments for untried programs in our district. Yes, our district has been highly regarded, but the children under these experimental programs have not yet graduated and gone on to higher education. Our sons' math teacher voted against the Connected Math Program in Plano and told us in a conference that he had never had to work so hard to keep his regular classes of students from failure.

Connected Math in Plano is not the only experimental program being tried on our young children. Plano wrote its own version of Integrated Curriculum and implemented it district wide about the same time our 6th grader started to school in 1993. Science and social studies are covered exclusively through integrated curriculum. Most of these studies are done interactively with a computer program and the teacher or another child is the facilitator. Neither Integrated Curriculum developed by this district or Connected Math has been proven to work. There are no statistics that validate such dramatic changes for elementary and middle school education. Worst of all, not one administrator or school board member asked the parents and taxpayers of this district permission to experiment on the children.

My younger children are in the gifted program in this district – so was our older son. All are good students, but our older son had to work hard to be a successful student. Our younger children breeze through with hardly an effort. Has education changed so radically that gifted children are no longer challenged in public education? Are we holding back some children so that all children can meet somewhere in the middle? Is this discrimination against minorities – those children who can succeed at a higher level?

I do not feel that Connected Math or Integrated Curriculum is challenging enough for young minds. I feel that trying these new programs is fiscally irresponsible. Our children will not be afforded the opportunity to fail with these programs because we supplement their education and will continue to do so. We teach them math from the Saxon math text at home. Connected Math, in and of itself, is not a horrible program.

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However, by itself, it does not meet the educational requirements mandated by this state. At best, it should be a supplemental program to a rigorous traditional math program. Parents were invited to and attended a meeting about the Connected Math Program at our school last fall. Most parents were there because their children were experiencing difficulties with the program. At the end of the meeting, the middle school's principal was handing out the Department of Education's endorsement of the controversial "fuzzy" math programs. It seemed to be Plano ISD's way of telling us everything will be great and we made the right choice for your child. Parents should be educating themselves to find out what math program best meets the needs of their children. I am a parent in Plano, Texas who wants the right to have a choice in the education of my children. The best way to help parents have choice is to keep educational issues at the local level where the results directly affect the taxpayers' children. The Department of Education should not be endorsing controversial programs such as Connected Math.

Sincerely,

Cheryl Regan

Cheryl Regan

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If math were a color . . .

By Marcia Tsicouris

In 1993/94 District 205 adopted the University of Chicago Everyday Math project as its K-5 curriculum and currently utilizes it to some degree in the middle schools and at the high school level. Since then, it has come up for review and the committee elected to re-instate it for another term. Why? I can only deduce the decision was based on economics and not the program's effectiveness. Everyday Math does not require the purchase of textbooks or workbooks. Copies are made from masters or other copies. We purchased the program only a few years after it went on the market. Is it possible to include Everyday Math among those of best practices after such a short time? The U of C acknowledged some of its shortcoming and published an optional Skills Link supplement in July 1998.

Everyday Math. On which days exactly is this program effective? If you're a 5th grader, maybe it works on the days you have art. Or, possibly, on the days you study nutrition, or on the days you discuss weather conditions. In lieu of practicing long division or mastering multiplication facts our 5th graders spend math time on exercises such as this: A. If math were a color, it would be --, because --. B. If it were a food, it would be --, because --. C. If it were weather, it would be --, because --.

If this type of, so called, math activity takes you by surprise, I'll allow time here for primal screams as did the author of the Wall Street Journal article where I first learned of this particular atrocity. (I verified its occurrence with my 5th grader!)

In 4th grade, my son's fraction assignment was marked wrong when he identified 1/5 of the dogs pictured on his Home Link as being spotted. After checking it myself and talking with the teacher I found the copy quality was so poor it was nearly impossible to detect that a 2nd dog out of 5 was spotted.

1st through 3rd graders are encouraged to become dependent on calculators, peers, and parents to accomplish their goals. Calculators are introduced early and often. Internationally, U.S. students' math scores ranked among the lowest in the world. Countries with the highest scores, Japan, China, and East Asian countries don't permit the use of calculators until high school. They feel students must first master the concepts and operations necessary for mathematical problem solving.

Everyday Math lessons are based on a spiraling curriculum providing no room for mastery in any one area. New concepts are introduced one after another assuming children will pick up on the material as it is sporadically revisited throughout the year. It's difficult to find two of the same type of math problem on any one Home Link. (If you do, its likely your child's teacher has opted to supplement with worksheets from other programs such as Addison Wesley.)

In an attempt to promote problem solving skills, many exercises are done in groups. Unfortunately, it is not possible to develop mathematical problem solving skills without the basic tools necessary to arrive at a correct answer. However, Everyday Math is not concerned with correct answers. This program prefers to emphasize the creative processes used to arrive at any answer. I hope my financial advisor, banker, pharmacist, etc. don't share the U of C's position on this. A math problem isn't solved

until you've reached the correct answer. Like a carpenter, a students' problem solving skills are useless with out proper tools!

Everyday Math places no importance on math facts, and no benchmarks are established in the program for mastering them. In place of math facts, students are required to learn a multitude of algorithms. Defenders of the program insist this clumsy process provides each student the opportunity to select the algorithm that works best for him/her. Yet, in 5th grade, instructions continue to specify which algorithm to use for the assignment.

Virtually every Home Link is prefaced with the words: Show someone at home; Have someone at home; With someone at home; Tell someone at home. The message sent to my 3rd grader is that she's incapable of doing math independently. Thanks to this program, essentially, she is incapable. I have to re-teach each concept as it arises (in addition to teaching basic math facts) because the U of C sees no merit in mastery.

Some may argue they like the program. As with Whole Language, there is a small population of students that possess a natural aptitude for the subject. These students will excel regardless how effective or ineffective the program. Whole Language is a testament to that. For the majority, Everyday Math will create generations of math disabled students as Whole Language created generations of reading disabled students.

Back to the ridiculous 5th grade exercise: If math were a color, it would be black and white, for math is an exact science with concrete, absolute, correct solutions. If it were a food, it would be something high in nutrition like fruits and vegetables, as these would nourish and develop the brain. If it were weather, it would be clear, bright and crisp to keep skills sharp and the mind alert.

Given our students are burdened with Everyday Math; the color of math is gray and fuzzy with little importance placed on correctness and none placed on mastery. The food choice is junk food with little nutritional value serving only to clog arteries and provide immediate gratification. And, weather, no doubt, it's a tornado whose spiraling winds leave our students strewn at the bottom of the scale.

By my calculations, Everyday Math equates to educational malpractice!

Check it out yourself. There are some great websites on the Internet. One of my favorites is Mathematically Correct at http://www.mathematicallycorrect.com.

Marcia Tsicouris

Marcia Tsicouris
Elmhurst, Illinois
630-279-0674

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LIZ SPELLMAN
2500 HILLRIDGE #7[illegible]
PLANO TX 75074

Our Struggle with Connected Math...

Our son is in Special Education and is a connected math failure. When he started at Armstrong Middle School in Plano, he was in an inclusion program along with "regular" children. During the math class, when problems were being worked out "as a group", he did not understand and would let the other children work the answer. He would only copy the answer. He did not grasp the concepts of the program. I tried to keep on top of things, but at the end of the year he was still failing with a 64. In order to pass to the 7th grade, he had to attend Summer School. (This was devastating to my son since as a Boy Scout he had to attend Summer School instead of going to Boy Scout Camp to work on his Eagle Merit Badges) The course that the teachers are required to attend to learn Connected Math happened to be during the time of Summer School, so Connected Math was NOT taught during Summer School that year. It was amazing how easily my son did his work. He understood what he was doing! He passed his Summer School math course with an 84! When school started, my son was once again in the inclusion classroom (I have no problem with this; as an educator myself, I think it is wonderful!) and once again was letting the other children do the work. I worked even harder trying to help him understand, and it was increasingly harder for me to understand since I had no book to go by. At the end of the 4th six weeks I contacted his Special Ed teacher with my growing concerns about his failing grades for a second year. I had to be a "mean parent" and let the teacher know that I did not care what she did, but my son would NOT fail math in the 7th grade. She said she did not have the power to insure that he would pass; I told her she had better get the power. Within the week, we were informed that our son would be transferred immediately to an easier math program. Needless to say, we were happy. Our son passed that year with a 74. He is now 14 and in the 8th grade at Armstrong Middle School. He is still in Special Education and still goes to the easier math class. He understands what he is doing, he loves doing his math homework, and I rarely have to remind him to do it. I wish all the children at Armstrong could go through the Special Education program so they could understand the math better.

Thank you,
Liz Spellman
PS... My son does have big ambitions for his future also. He wants to be in the Navy and learn Marine Biology, which takes a lot of math and science. If he wants it, there is no reason he cannot achieve his goal!

Dallas Chinese Fellowship Church

2640 Glencliff Drive
Plano, TX 75075

達城中華基督徒恩友堂

認識上帝的見證，長成基督的身量

January 27, 2000

House Committee on Education and the Workforce

Dear Committee Members:

I am writing this letter in support of Mrs. Susan Sathardy's testimony before your committee. My own personal experience with the Plano ISD school board shows to what length they can go to stifle dissent.

During the school board meeting on June 1, 1999, I presented charts to the board showing Plano spends more than most other districts. One board member complained that the operating expense per pupil for Plano was incorrect and took the opportunity to discredit me. The Associate Superintendent of Business Services kindly spoke in my defense saying that the figures were taken exactly from the Texas Education Agency (TEA) - the mistake was not mine. Subsequently, TEA confirmed that Plano submitted the wrong figures for 1997 to 1999.

A week later, I got a call from the Plano Police at church requesting that I come down to the station. For half an hour, I was questioned about my recent involvement with educational issues. Subsequently, I learned that two school board members had received some anonymous mail of a threatening nature at home (one of them was the same board member who chastised me). My name was given as a suspect. Before leaving, I was asked to leave an entire set of fingerprints.

If there was a genuine concern this could be misconstrued as an opportunistic attempt to intimidate a critic; one would have reasonably expected an apology now that I'm cleared (the police found the real culprit). From what I learned from long time residents about PISD's track record, I would not hold my breath.

It is ironic our schools lament the lack of parental involvement in children's education. For when parents decide that 'involvement' means more than making copies, buying branded school supplies or speaking only supportively of school programs; when parents try to become actively engaged in crucial decisions, local administrators have made clear that education is best left to the professionals.

Local control has an attractive ring in some circles in federal and state government. But what eventually happens at the grassroot level is the prevailing power structure wrests control from those that needs it the most - parents.

Sincerely,

Rev. Jennifer Soh

" ... rooted and built up in Him, strengthened in the faith ... " - Col. 2:7

Phone (972) 612-7227 Fax (972) 985-3288 [redacted]

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ED & JILL STEWART
2604 TROPHY DRIVE
PLANO, TEXAS 75025-2423

January 28, 2000

House Committee on Education
Washington, D C

Gentlemen

My wife and I sold our house in Dallas and moved to Plano, Texas in 1992 for the sole purpose of providing our children with the opportunity for a better education in the Plano Independent School District ("PISD"). We took a loss on our house in Dallas and were faced with paying higher taxes in Plano. It was our opinion that the schools were better in Plano, therefore such a move would be justified.

We have been very pleased with the PISD until the start of the 1999 school year. This is the year that the PISD decided to implement the Connected Math program. Without going into to great detail, let me simply say that this is the most confusing program I have ever seen. My son spends hours trying to solve some problem that doesn't make a bit of sense. The instructions are vague and there are no examples to refer to in the book.

As part of a homework assignment, my son was asked to find the answer for 47 divided by 9. I went into detail on how to divide 47 by 9 and come up with an answer of 5 2222. His teacher counted his answer wrong as the "correct" answer was 0. This really prepares him for the real world doesn't it?

Math is one of the most important subjects in school. Mathematics is an essential part of my functions at work, as well as an everyday tool in my personal life. Therefore, it makes me very angry to know that my children are not being taught basic mathematical skills.

We, as tax paying parents, should have a say in our children's education. Especially when a controversial program, such as "Connected Math" is implemented. We demand a choice!

Very truly yours,

Ed Stewart
ES/ems

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Gifted Advocate

Montgomery's Voice for Standards and Accountability

Gifted and Talented Association of Montgomery County, MD, Inc.

Nov/Dec 1999
Volume 24 Number 1

Inside . . .

3-6 Fuzzy Math special report

Combined Federal Campaign
CFC 7868

Co-Presidents' letter

by David Hoffman

Superintendent Weast, how should we work with you?

That's been a hard question to answer, and it dictates the content and tone of the *Gifted Advocate*. That's we've delayed publishing until now.

The superintendents's Call to Action was a huge disappointment. Since then, we've had conversations with Supt. Weast, Deputy Supt. Seleznow and several administrators, and we're seeing the first hints of major change.

We are anticipating a clear directive to provide accelerated instruction of one-and-a-half years of math per year for gifted students and any others who want the added challenge; a nonsecretive consensus-building process for curriculum development; full implementation of Hands-On Equations and the William & Mary Reading/Language Arts program; some exciting elementary school curriculum initiatives in writing, social studies, and mathematics; and even the hope of doing something in middle school.

Moreover, the long-awaited up-county magnet is about to be launched with $75,000 in planning funds that the Board of Education approved last year! (Email us at jhoven@erols.com to get plugged into that effort.)

See CO-PRESIDENT page 2

Superintendent's Call to Action: Bold on Closing the Gap, Vague on Raising the Bar

John Hoven

One week after releasing his Call to Action, Superintendent Weast told a community forum that the plan is "heavy on Closing the Gap, needs more on Raising the Bar."

The disparity is most evident if one looks first at the "Early Success" initiatives targeted mainly at getting students ready to learn when they enter kindergarten. (See sidebar, p. 7) These are specific, ambitious, and imaginative. They include proposals which cost a good deal (smaller classes, all-day kindergarten) or nothing (cross-grade grouping), proposals for interagency collaboration (birth-to-five literacy support) or for MCPS alone (early childhood assessment), and they recognize that learning begins at birth.

In contrast, the trend-benders for average and above-average students turn to mush with the question, "What specifically will we do?"

See CALL TO ACTION page 7

Gatekeeping ends for Math Investigations/Accelerated Math 7

Any student who wants the added challenge of Investigations in Mathematics (IM) (formerly Accelerated Math 7) will be allowed to take it. That's what the MCPS Policy on Gifted Education requires, and now it's a reality.

Deputy Superintendent Steven Seleznow approved a memorandum to the schools September 30 that concludes with this ringing mandate: "If the school and parent disagree and are unable to resolve differences over the appropriate placement for the student, the school shall defer to the parent request."

Investigations in Mathematics is the prealgebra course that prepares students for Algebra I in 8th grade (or earlier). It

See GATEKEEPING page 2

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CO-PRESIDENT from page 1

The disappointment in the Call to Action is that "raising the bar" is devoid of specific plans for average and above-average students. That seems to have been recognized by everyone who read it, and Superintendent Weast appears eager for advice on how to fix it. So now is the time to pay attention and sound off. The Call to Action is at http://www.mcps.K12.md.us/info/calltoaction.html and can be easily downloaded and viewed in the Adobe Acrobat viewer. This issue of the *Gifted Advocate* will orient you, but you need to form your own opinions and act on them. How do you want the honeymoon to end?

The GTA LETTERS email forum is still hot on fuzzy math and the superintendent's plan. Other recent topics are middle school honors classes, CRTs, ability grouping, advanced placement courses, parent satisfaction surveys, foreign language instruction, and high school start times, in addition to announcements of coming events. If you are missing out, Email John Hoven at jhoven@erols.com, and tell him to put you on the distribution list.

If you recently got returned as undeliverable your GTA membership renewal, send it back in to the new mail box! We are also in the CFC drive this year, so check off #7868 if you are a Fed and so inclined. We have new membership brochures ready to distribute, so if you have a GT PTA committee meeting coming up, let us know.

Our student panels on the highly gifted centers and the middle school magnets were very well attended (Standing Room Only at one). I was amazed at the number of primary grade parents that were clueless about what ISM is and how it is used as part of the teaching process to track progress in math. It's a great device that tracks the math curriculum and reports on your kid's standing. But the new parents don't know that it exists. Suggestions?

Our next program is Dec. 8, with a terrific speaker line-up to answer the questions we get asked most: "My child has been identified as GT, now what? How do I advocate for my child in their school, and what can be offered?" See back cover for details. And reserve Jan. 19 for GTA's Summer in January extravaganza of summer programs and internships.

The rest of the year will be very busy for GTA. Maybe we can break into the curriculum content inner circle and have input on what our children should learn. Perhaps the days are over when GTA had to file state FOIAs to get basic information. Perhaps (and we'll know soon) we are opening the door into a new era when GTA will be a partner instead of a critic of Montgomery County Public Schools.

GTA is a volunteer organization that promotes educational opportunities for gifted students in Montgomery County schools and serves as a resource for parents, educators and other interested parties. Membership is $15 per year. For more information, call (301) 926-4371.

John Hoven 593-1702 Co-President
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(301) 926-4371

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Screening exams will no longer be administered routinely for investigations in Mathematics

GATEKEEPING from page 1

is the gateway to 8th grade algebra, because 78% of IM students go on to 8th grade algebra--but only 13% of Regular Math 7 students.

Previously, recommendations for placement into IM were made on the basis of screening exams, specifically, the Orleans-Hanna and Math Skills Inventory. However, data released last year by MCPS demonstrated that these exams have hardly any ability to identify students who are unlikely to succeed in IM. These exams will no longer be administered routinely.

Students and parents should still seek out advice from students, teachers, and parents, to decide whether MI is the right choice--in exactly the same way they would consider an honors class in high school. In fact, that is clearly the obligation of a responsible parent.

Because the school will defer to the parent's request.

"If the school and parent disagree and are unable to resolve differences over the appropriate placement for the student, the school shall defer to the parent request."

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Fuzzy math -- warm intentions and wooly thinking

Dear John Hoven,

I assume, or rather hope, that you are the John Hoven mentioned in today's Post as leading the charge against Connected Math in Montgomery County. Although I am only a parent and not a mathematician, I do have one qualification for commenting on the controversy that most people directly involved in the dispute may be lucky enough to lack: direct experience.

My daughter Jessie, now 12 but about to turn 13, was exposed to Connected Math last year as a 7th grader at The American School in Japan. She had an impressive, bright, dedicated teacher who had mastered the Connected Math theory and curriculum, and the resulting course was ... an unmitigated, unqualified disaster.

Jessie had been in the Gifted and Talented program in Fairfax County from the third through the sixth grades, and had done quite well in math. The summer after her sixth grade year, as we were on the way to Tokyo, she attended the Johns Hopkins CTY program and took an individually paced math sequence. Again, she did quite well. She's a happy, well-adjusted, polite, mild mannered kid, not a trouble maker. But she simply could not tolerate Connected Math, which we both began to call Conversational Math. Since The American School had a principled (or perhaps only The Principal's) objection to any ability grouping for middle school kids, she was stuck with it. Or so they thought. We first enrolled her in an Algebra I distance learning course offered by the Hopkins CTY program, which she completed in about 7 weeks, and then we transferred her to a Japanese international school. Jessie was moved up to the 8th grade and into a wonderful geometry class and completed it in fine style.

> *Jessie simply could not tolerate Connected Math, which we both began to call Conversational Math.*

We returned to the US this summer and have settled in Albemarle County, outside Charlottesville, where Jessie is "repeating" the 8th grade (otherwise she'd be two years younger than all other 9th graders in a new school, new town, etc., which we thought too much) but is being allowed to take Algebra II at the high school across the street.

I HATE the thought of any bright kids being forced to sit through Conversational Math. It is like water torture for them, not to mention the fact that they don't really learn anything. We are not the kind of parents, nor is Jessie the kind of student, who prefer drills and rote learning to thinking/understanding, but the fact is--and I say fact because it is based on our hard experience--Connected Math simply doesn't work for bright kids, no matter how elevated its pedigree OR how good the teacher. As Jessie says, "it may be fine in theory, but then communism was fine in theory." Maybe it could be a good substitute for remedial math, but any place that institutes it and does not provide real math as an alternative is guilty of gross educational malpractice.

Good luck.

John Rosenberg, Crozet, Va.

From the Ch[illegible] edition, for [illegible] unit. Bits and [illegible]

This inve[illegible] the part-whole, i[illegible] of fractions.

(Hold up a new, [illegible] strip). "How can I [illegible] strip to show thi[illegible]

Fold a strip by following a student's instructions. Ask the class whether they agree that the method results in a strip that is divided into thirds.

"Now, I want you to make your own fraction strips. When everyone is finished, we will discuss what we have found before we move on to the rest of the problem."

Encourage your students to label strips "halves," "thirds," and so on. It is not necessary for students to label each mark with a fraction, although some of your students may be comfortable enough with symbols to do this.

If students are having difficulty, suggest that they ask another student for help.

When most students are finished making their strips, begin a class discussion in which students share their folding strategies.

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Connected Math Program (CMP) flunked California's textbook review. Here's what the reviewers said about it:

R. James Milgram, Professor of Mathematics
Stanford University

Overall, [CMP] seems to be very incomplete, and I would judge that it is aimed at underachieving students rather than normal or higher achieving students. In itself this is not a problem unless, as is the case, the program is advertised as being designed for all students. . . .

Standard algorithms are never introduced, not even for adding, subtracting, multiplying and dividing fractions -- precise definitions are never given -- repetitive practice for developing skills, such as basic manipulative skills is never given. Consequently, in the seventh and eighth grade booklets on algebra, there is no development of the standard skills needed to solve linear equations, no practice with simplifying polynomials or quotients of polynomials, no discussion of things as basic as the standard exponent rules. . . .

The last booklet in the series for sixth grade is . . . entirely remedial . . . consistent with the content which corresponds with the California Third Grade Standards.

Richard Askey, John Bascom Professor of Mathematics
University of Wisconsin at Madison

[CMP] is a hard program to evaluate year by year since so much of it is a year and sometimes two behind what California is asking for. . . . The [Calif.] standards are often not met in time, and sometimes they are never met. That was not a surprise. The carelessness in some of the problems, answers and comments was a surprise.

Some calculations with fractions are done, especially adding and subtracting, but too little is done with multiplication and nothing with division, either in sixth grade or even seventh and eighth.

Our students will not learn what they are not taught, probably the only lesson which came out of the New Math which has positive implications for what we should do. . . .

The authors are against telling students anything until the students have done some exploring, and even then little is told in the way of serious explanations for why something holds. Some student exploration is a good thing, but to rely on it almost exclusively to develop mathematical ideas is very inefficient.

Milgram and Askey's views were supported by nearly 200 top mathematicians and scientists in a full-page ad that appeared in the Washington Post and other major newspapers November 18. The signatories included two winners of the Field Medal, which is the top honor in the field of mathematics, and four Nobel laureates in physics.

"These curricula are among the worst in existence."

The letter criticizes the Connected Mathematics Program and similar NSF-funded curricula for serious mathematical shortcomings and deficiencies, as well as for a "general lack of careful attention to mathematical substances."

"These curricula are among the worst in existence," said one of the letter's authors, Cal State Northridge math professor David Klein. (Los Angeles Times, Nov. 18)

CMP is aimed at 6th graders who have "some understanding" that 2/3 is part of a whole--that is, some understanding of what they were taught in 1st grade

"We assume that students coming into CMP at Grade 6 have a firm grasp of whole numbers, some understanding of the part-whole interpretation of fraction and the place value interpretation of decimals, and some acquaintance with geometry and measurement."

-- Getting to Know Connected Mathematics (1996)

Milgram and Askey criticisms of CMP must be taken seriously, MCPS reviewers say

Our group simply did not have sufficient time or resources to produce a definitive report. . . .

There are some criticisms, such as those of Professors Milgram, Bishop, and Askey that must be taken more seriously and addressed.

We recommend that parents be allowed to opt out of the new curricula for their students in each school where it is introduced. . . .

We are concerned because it does not appear that parents were adequately informed and involved in the selection process for new mathematics curricula.

-- Report of the ad hoc committee on middle school mathematics (10/13/99)

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Mathematicians criticize fuzzy math standards

Ray Russo

Committees of the American Mathematical Society (AMS) and the Mathematical Association of America (MAA) have expressed concerns regarding the draft Standards 2000 of the National Council of Teachers of Mathematics (NCTM). Highlights of their concerns appear below. The full reports can be found at

www.ams.org/government/nctm2000.html
www.maa.org/past/maa_nctm.html

- **Lack of differentiation by ability**
  Differentiated instruction is necessary. Students differ, so curriculum and instruction must differ.
- **Failure to teach mastery of skills and content**
  Mastery of skills is aggressively downplayed. Learning arithmetic facts and practice drill is discussed but always in a negative light. Coverage of mathematical content is made even more difficult by not requiring Algebra until grade 9.
- **Failure to stress symbolic notation**
  The use of variables is pervasive in our society and can be introduced in a natural way in the earliest grades. Indeed, the use of letters to represent numerical quantities shouldn't be treated as any more unusual than the use of words to represent objects and ideas.
- **Indiscriminate use of calculators**
  Calculators should support, not supplant, other methods of computation, including paper-and-pencil algorithms.
- **Rigid reliance on constructivism**
  The NCTM Standards emphasize that children should create their own algorithms, since children will "own" the material if they create it themselves. This is a fallacy. Children do not need to create their own sports rules or write their own music in order to "own" the material, and to work hard and excel.
- **Failure to teach standard algorithms**
  Standard algorithms are like spelling conventions. Eventually, as a matter of mutual communication and understanding, it is highly desirable that nearly everyone learn a standard way of doing the four basic arithmetic operations. The genius of algebra and calculus is that they allow us to perform complex calculations in a mechanical way without having to do much thinking.
- **Failure to teach formal proof, precise definitions, and strict logical reasoning that lead to one correct result**
  The discussion of reasoning and proof is disappointing. Students should understand the difference between a proof and a collection of examples. Terms must be clear and well defined. The principle that reasoning has to start somewhere and that the starting point is defined by the axioms should be explained clearly.
  One of the most important goals of mathematics courses is to teach students logical reasoning. Although there may be many routes to a solution, based on the hypotheses, there is but one correct answer in mathematics.
  Starting no later than the 8th grade, students' mathematical sensitivity should be sharpened. They need to start picking up on logical subtleties and appreciate the need for airtight arguments before making conclusions. They will soon be called upon to make distinctions between truths and pseudo-truths in the much more difficult context of human and social issues.

5

Math coordinators Nancy Metz and Keith Jones intend fuzzy math as the model for math instruction in MCPS

"MCPS requests teacher enhancement funds to support the implementation of a system-wide reform of middle school mathematics."

The MCPS Grant Proposal for Teacher Enhancement Program of the National Science Foundation, August 1999, says:

The agenda for reform in MCPS middle school mathematics has been set.

MCPS is committed to the development of a standards-based* middle school mathematics curriculum and to the adoption of curriculum materials that support it. [Specifically,] the three standards-based textbook series, *Connected Mathematics Project, MathScape, and Math Thematics* . . .

This project encompasses a comprehensive staff development initiative that provides for **all Grades 4 through Grade 8 teachers of mathematics.** (emphasis added)

* Refers to the standards of the National Council of Teachers of Mathematics (NCTM), not the more rigorous California standards.

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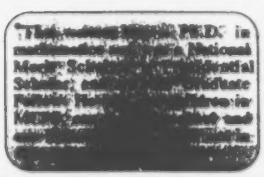
The critics are correct – Connected Math is seriously flawed in all areas.

Ray Rosso*

I have been following closely the controversy over the MCPS proposal to pilot a National Science Foundation math curriculum. I spent many hours analyzing the Guide to Connected Mathematics, the Teacher's Editions of several CMP curriculum units, the National Council of Teachers of Mathematics (NCTM) Curriculum and Evaluation Standards for School Mathematics (1989), the discussion draft NCTM Principles and Standards Document (1998), the MCPS Instructional System of Mathematics (ISM) curriculum, the California Mathematics Academic Content Standards, my children's notes from their middle school magnet math classes, and some of the research that underlies the NCTM Standards and the proposed curriculum changes.

The conclusion of my evaluation is that the critics are correct. CMP is seriously flawed in all areas.

Philosophy and goals: CMP wants students to learn that math "is arbitrary, and good solutions are arrived at by consensus among those who are considered expert." It wants to "show students that many mathematical questions have more than one right answer." These are fundamentally wrong statements that will confuse students about how formal proof is used in mathematics to determine truth.



Math content: The CMP content is less than the MCPS ISM curriculum, and fares even worse when compared to the more demanding California standards. On-track students should be prepared for Algebra I in 8th grade.

Teaching methodologies: Different students will respond to different approaches and paces. CMP, however, uses a dogmatic, one-size-fits-all discovery methodology where students "bump into the mathematics." The teacher is frequently reduced to a group organizer and facilitator. The discovery method, particularly group discovery, is just too slow and inefficient to cover much material, depth, or conceptual understanding. The methodology also diminishes the time spent on math by including too much extraneous writing, picture drawing, paper folding, etc.

Technology: Calculators should be used to illustrate concepts or to remove the tedium of intricate calculation, not to avoid learning how to calculate. CMP allows indiscriminate use of calculators ("Students will have access to calculators at all times") and gives no emphasis to facility with computational procedures or algebraic manipulations.

Student assessments: CMP utilizes fuzzy assessments that mask the math shortcomings of students, grade them on activities not related to math, and homogenize their grades. Here is the scoring rubric for a major project, which is to plan a park: "A total of 50 points is possible. 23 for the scale drawing, 22 for the report, and 5 for the letter." Correct math calculations count for 6 of the 50 points. Neatness, organization, grammar and spelling can be worth up to 8 points.

Supporting research: Most persons will be surprised to learn how little support research provides for proposed innovations in math curricula such as CMP. A very good and candid article, "Relationship between Research and the NCTM

> *The CMP content is less than the MCPS ISM curriculum, and fares even worse when compared to the more demanding California standards.*

Standards," by James Hiebart appears on the NCTM Web site (www.nctm.org/jrme/abstracts/volume_30/vol30-01-hiebert.html). The research is also much more cautious and nuanced in its findings than programs like CMP are in their dogmatic approaches.

Evidence of CMP effectiveness: Studies designed to evaluate CMP are self-serving evaluations that define effectiveness in terms of CMP's values. However, CMP admits "some CMP students may not do as well on parts of standardized tests assessing computational skill [which includes algebraic manipulations as well as arithmetic]." Most parents should not be satisfied with such a trade-off. It is possible, in fact necessary, to have both good computational skills and mathematical understanding.

Correction.

In the *Gifted Advocate* for May/June 1999, Marian Kester Coomb's reference to "a remedial math program for the innumerate masquerading as a reformed curriculum" was not a direct reference to CMP, but rather a reference to fuzzy math curricula generally.

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CALL TO ACTION from page 1

The math litmus test

The litmus test is mathematics, because we know quite specifically what "raising the bar" means. The Third International Math and Science Study (TIMSS) demonstrated that students in the US are still doing arithmetic in grade 8, while the rest of the developed world has gone on to algebra. In response, some of the more ambitious US school systems—including the entire state of California—have revised their math curricula to prepare all students for Algebra I by grade 8.

The Call to Action flunks that litmus test. The goal is still Algebra in Grade 9.

Performance Indexes

Poorly designed performance indexes nurture poor performance. The description in the Call to Action is not especially reassuring.

• **Value-Added Productivity** identifies schools that produce relatively more student gains from one year to the next year than do other schools.

One year changes are random noise. The index should instead look at trends or moving averages.

CRTs are grade-level tests, with few test questions above or below grade level. That means they do a poor job of assessing the skills of students above or below grade level. The consequence is that value added measures based on grade level CRTs are meaningless for students above and below grade level.

The remedy is to have students take CRTs appropriate to their instructional level. For example, the 3rd grade math CRT might be taken by students who have mastered at least 85 ISM objectives (halfway through 3rd grade) and no more than 114 ISM objectives (halfway through 4th grade). A very low or very high CRT score strongly suggests an inaccurate ISM profile, which should be corrected at the beginning of the next school year. It may also be advisable to give these students an opportunity to retake a more appropriate level CRT in the fall.

• **Academic Proficiency Index** represents the percentage of students in a class or school that meet or exceed the established standards.

This encourages schools to focus resources on the students who can be nudged just over the line (e.g., students scoring 630 to 680 on CRTs). Amazingly, this invites schools to neglect low-achievers, high-achievers, and students in the middle.

The remedy is to report test score averages rather than the percentage of students who score above a threshold score. One can report separate averages for students on, above, and below grade level to ensure appropriate attention to each group.

• **Equity Index** shows the extent to which each of the racial/ethnic groups in the school attains academic proficiency.

A poorly designed equity index will reward schools who deny learning opportunities to Asians and Whites. The problem can be avoided by defining indexes for each group, rather than setting them against each other.

• **Quality Index** describes levels of attendance, special education referrals, suspensions, parent/student/staff satisfaction, etc.

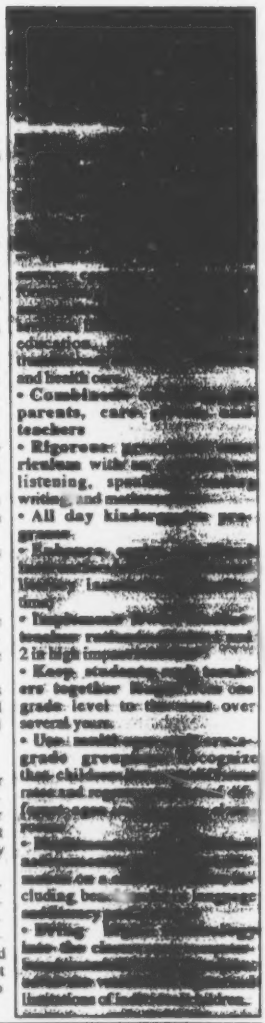
It is questionable policy to urge schools to reduce referrals and suspensions, rather than inappropriate referrals and suspensions.

Satisfaction surveys are notorious for inflated percentages. A partial remedy is to use trends or published surveys as a base of comparison.

Shared decision-making

The Call says, "We must foster shared decision-making among parents, administrators, staff, and other members of the community." But the specifics keep parents safely distant from any decision-making.

Curriculum is an especially appropriate arena for shared decision-making because curriculum documents are relatively simple, and because all stakeholders can and should help decide what we want our children to know and be able to do.



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For your PTA newsletter . . .

Wednesday, Dec. 8, 7:30-9:30 pm
Luxmanor Elementary School
6201 Tilden Lane, Rockville, MD

My child has been identified as GT. now what?
How do I advocate for my child?
What can be offered?

A public forum sponsored by
Gifted and Talented Association of Montgomery County

Featured speakers

- Ms. Diana Wollin, Principal, Oakland Terrace ES
- Ms. Aara Davis, Asst. Principal, Oakland Terrace ES
- Mr. Steve Bedford, Principal, Lee MS
- Mr. Kevin Sawyer, Principal, Sligo MS
- Ms. Sandy Harris, Director, Montgomery College Saturday Discovery Programs for Gifted and Talented Children
- Dr. Bill Alexander, Parent, Twinbrook ES
- Ms. Beverly Jennison, Parent, Kennedy HS

Also:

Summer in January
Summer camp fair (and internships!)
January 19, 2000
Luxmanor Elementary School

Gifted and Talented Ass'n of Montgomery County, MD, Inc.
believes that:

All children, including those with outstanding abilities, deserve an appropriate education and the opportunity to achieve their potential.

The goal of instruction should not be minimum competence or grade-level achievement, but that each student's capabilities should be developed to the fullest extent possible.

Children whose capabilities are ignored do not turn out just fine; they learn less, aim lower, endure emotional distress, and enter college and the workplace unprepared for challenging pursuits.

Gifted Advocate

Gifted and Talented Ass'n of Montgomery County, MD, Inc.
P.O. Box 60243
Potomac, MD 20859-0243

NON-PROFIT ORGANIZATION

Address Service Requested

Susan Sarhady
2508 Trophy Drive
Plano, TX 75025

75025+2421

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Appendix J-The Written Statement Of James Rutherford, Education Advisor To The Executive Officer, American Association For The Advancement Of Science, Washington, DC.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Executive Office

1200 New York Avenue, NW
Washington, DC 20005
Tel: 202 326 6640
Fax: 202 371 9526

James Rutherford
American Association for the Advancement of Science
Testimony Before the Subcommittee on Early Childhood, Youth and Families
And
Subcommittee on Postsecondary Education, Training and Life-Long Learning

February 2, 2000

Thank you for this opportunity to describe the work of the Expert Panel in Mathematics and Science Education. I believe that the Panel carried out its assignment responsibly, and that as a consequence of its experience it is in a position to recommend improvements in the conduct of such evaluations in the future.

I will comment on the composition of the Expert Panel, what the Panel took its job to be, how it went about the task, and what it believes its main contribution was. My comments are not intended to constitute a detailed history of the work of the Expert Panel in Mathematics and Science Education, but rather to provide you with a brief overview of the Panel and its work. In this, I speak for myself and not for the members of the Panel. In responding to your request to appear at this hearing, I had no opportunity to compare my recollections to the records, or to vet my testimony with the Panel members. I believe, however, that what follows is an accurate rendition.

The Panel

In mid-1996, the then Assistant Secretary for Research and Improvement, Sharon Robinson, assembled the Expert Panel in Mathematics and Science Education. In her letters of appointment, she said the Panel "will be particularly influential because it is a pilot for future expert panels. One of the most important roles of the Panel will be to establish policies and procedures to ensure the efficient and effective operation of future panels."

The Panel was well designed to carry out such an assignment. It is composed of knowledgeable professionals known to be leaders in their fields. While the panel is relatively small, collectively it is well representative of the territory being addressed—mathematics and science education. It includes mathematicians and scientists, individuals with K-12 teaching experience, state science and mathematics supervisors, education researchers, teacher educators, and representatives of science and mathematics organizations engaged in K-12 education reform efforts, such as the National Academy of Sciences, the American Association for the Advancement of Science, the Council of Science Society Presidents, and the National Science Teachers Association.

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In short, the members of the Panel are highly qualified individually, and the Panel as a whole is well balanced in terms of professional expertise. Moreover, without exception the members of the Panel are deeply committed to the improvement of science and mathematics education nationwide, have individually worked toward that end in one way and another over the years, and hence took this assignment as an opportunity to make a useful contribution to reform.

Not surprisingly, such persons hold different views on many matters and are not hesitant express them. As a result, the Panel discussions were intense and pointed, which is surely what one wants, but were never obstructive or mean spirited. Anyone observing the Panel at work would quickly be persuaded that, as a panel, it was not of a single mind on every issue and had no collective hidden agenda. One may, of course, take issue with the recommendations of the Panel, but not, I believe, with its qualifications or the seriousness with which it carried out its assignment.

The Panel's Perspective

The first thing that the Panel realized as it got to work was that the task it had accepted was vastly more complicated than it had supposed. For one thing, there was no process in place identifying promising and exemplary programs in science and mathematics—the Panel would have to design the process from the ground up. Indeed, the Panel quickly came to the conclusion that its main responsibility was to design an effective, fair, and manageable procedure for assessing science and mathematics programs.

But what *kinds* of science and mathematics programs? The legislation defines educational programs to include "educational policies, research findings, practices, and products." It adds that they "may range in size and complexity, from an individual product or a practice centered on specific grade levels or target groups to a school system-wide initiative, to a state curriculum framework" and include "all levels of education— preschool through postsecondary." Rather sweeping, one might say.

Too sweeping, in fact, for the Panel to cope with, and so it decided that it would have to narrow the focus of its effort to something manageable yet significant. After considerable discussion, the panel decided that it would concentrate on developing a system for evaluating K-12 instructional materials in science and mathematics. Other important matters having to do with the quality of science and mathematics education in the schools— teaching practices, assessment, research, policies, teacher education— would have to wait, as would the evaluation of preschool and postsecondary materials and programs in science and mathematics.

Another complication facing the Panel was the lack of specificity in the terms used in its job description. Clearly the Panel would have to give conceptual and operational substance to such large categorical terms as "Evidence of Success, Quality of the Program, Educational Significance, and Usefulness to Others." Similarly, attention would have to be given to clarifying the meaning of such matters as the requirement that promising programs in science and mathematics education meet specified criteria "with respect to one context or one population," and that exemplary ones meet the criteria "with

respect to multiple contexts or multiple populations." So, too, such terms as "high expectations," "substantially improved," "beneficial," and "contribute to." As it turned out, in order to address the need for inter-reviewer reliability of the process it was creating, the Panel had to spend a large part of its time clarifying vague language and formulating very explicit criteria and indicators.

Of particular interest to the Panel was the need to place materials on evaluation on a sounder footing than it had been in the past. All too often judgements on the effectiveness of instructional materials have had to be made on the basis of anecdotal claims, usually limited in number and not systematically assembled. The Panel realized that making judgments on the basis of scientifically sound studies is difficult for many reasons, not the least of which is the time and cost involved. Nevertheless, it felt strongly that it could make headway in designing a system that would raise evaluation some level above current practices and enable educators to rely on more than individual testimony in making judgements when selecting science and mathematics instructional materials.

In short, the Panel saw itself engaged in designing a process for evaluating K-12 science and mathematics instructional materials, including defining the criteria to be use in the process (even as it complied with the requirement that it submit recommendations to the Secretary of Education on promising and exemplary programs). This view was reinforced by growing realization of the Panel members that it would be neither appropriate nor feasible for they themselves to serve as the primary program reviewers. The Panel simply believed that, as the first out of the gate in the Expert Panel series, it could do no more—and should do no less—than to design and oversee the implementation of a evaluation process that would be reasonable as a first try, that could be refined on the basis of experience, and that could gradually be expanded to include other aspects and levels of science and mathematics education. That is how it saw its job.

The Panel Approach

Generally speaking, the Panel members brought a lot of first-hand knowledge to the task at hand. Still, they realized that they needed to be brought up to date on matters relating to the evaluation of programs and materials, and also to become aware of the possibilities before them. To that end, the Panel drew on background papers and briefings by specialists. Examples include:

- "Analysis of the Standing/Expert Panel Model and Options for Improving the Review System" by Susan E. Klaiber and Margaret J. Simon of RMC Research Corporation.
- A review of other efforts of program evaluation undertaken previously in the U.S. Department of Education by Department staff.
- An Internet discourse with Lois-Ellin Datta and Michael Scriven on program evaluation strategies.
- "Evaluation and Standards for Schoolwide Programs and Programs Conducted in Multiple Sites," by John C. Hollifield, Samuel C. Stringfield, and Rebecca Herman of Johns Hopkins University.
- A seminar on mechanisms of materials analysis lead by Dr. Jo Ellen Roseman of the American Association for the Advancement of Science's Project 2061.

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(which has been conducting research on, and developing techniques for, materials evaluation for several years).

Until the actual field reviews were completed, the work of the Panel consisted mostly of the following:

- Agreeing upon and refining the language of the evaluation criteria (in many ways the most difficult part of the work).
- Completing the architecture of the evaluation process. This involved not only setting out a sequence of steps leading to final recommendations, but reaching agreement on a wide variety of related issues such as, which learning goals to focus evaluation on, how much material to be sampled from each submission, what documentation to require of submitters and reviewers, and more.
- Defining the characteristics of the field reviewers, setting out the process for recruiting them, establishing the procedures and forms they would be expected to use, and determining the nature of their training. Some of this was difficult due to the fact that at the time it was not known—there having been no previous experience—how many submissions to expect, and hence how many reviewers to recruit and train.
- Overseeing the formulation of the instructions and forms to be distributed to potential submitters.

As the design began to shape up and as headway was made in clarifying the criteria, the Panel felt the need for external feedback. Accordingly, two pilot tests were conducted.

- One involved selecting a panel of mathematics reviewers and one of science reviewers, training them, and having them evaluate some selected materials. Interviews with the evaluators and an examination of their reports provided very useful information on the amount and kind of training needed, the size of review panels, and the clarity of the evaluation criteria.
- The other pilot test had potential submitters respond to the draft submission requirements. This led to a substantial rewriting of the submission document.

In late 1997, Senta Raizen and Patricia Bourexis of the National Center for Improving Science Education evaluated the work of the Panel. The report was generally positive. It said that the Panel had made substantial headway in developing clear and coherent criteria, that its pilot test of the training and evaluation process had been well conceived and conducted, and that it had demonstrated that consensus could be reached on what are by their nature often contentious matters. It also expressed some concerns about the timeline and about the heavy demands the process was placing on the time of the Panel members.

It should be noted that in all of this, the Panel did not have the advantage of operating under a formal set of specific guidelines. Such matters as how many members would have to be present for the Panel to conduct business, voting protocols, stand-ins for appointed members, and remote participation were not strictly defined. But the members are all seasoned veterans when it comes to doing business by committee, and I can recall no serious dispute over Panel process. For the most part, the Panel worked its way toward

consensus without having to resort to many formal votes. While there was not total unanimity on every decision, I know of no instance in which a decision was made that did not reflect the view of a majority of the members present. And while one can never be certain, I would be surprised to find that any decision made by the Panel would have been different had all members been present.

The Review Process

As stated at the beginning, the Panel believed its main contribution would be the design of a fair, effective, and manageable process for evaluating K-12 science and mathematics instructional materials, a process that could then be improved and extended by future Expert Panels in Mathematics and Science Education. It is up to others to judge how well the Panel did in that regard.

The Department of Education documents "Guidelines and Materials for Submitting Mathematics Programs for Review" and "Guidelines and Materials for Submitting Science Programs for Review" specify the criteria to be used in evaluations and the indicators that define the criteria. It also makes clear what is expected of submitters. There is no reason, therefore, for me to summarize those matters here. But it may be helpful to the Committee to summarize the process developed by the Panel and used in the first round of assessments. It is as follows:

- The Department of Education publicizes the existence of the opportunity to have science and mathematics instructional materials evaluated, making sure that the terms and conditions are made clear, including that submission is entirely voluntary and the names of programs not designated promising or exemplary would not be made public.
- Organizations that wish to do so submit the required materials and information by the deadline.
- The Department of Education, through its contractor, returns the submissions that are not complete, and allocates the others to review panels. Each submission is sent to two two-person Quality Review Panels (QRP).
- The QRPs review the submissions they receive, following the procedures set out by the Panel, and send their findings to the Department's contractor. Each reviewer report is required to cite the evidence it uncovered for each of the seven quality criteria, render a judgement on the evidence, rate the material on each criterion, and write a justification for its conclusions.
- Submissions that meet the quality standards, as judged by the QRPs, are then forwarded to Impact Review Panels, the others returned to submitters with feedback. The IRPs are composed of experts in the analysis of the impact of educational programs.
- IRPs analyze the submitted impact evidence and return their findings and recommendations to the Expert Panel. The Panel then looks at the analysis and commentary of both the QRPs and IRPs with regard to each submission, referring as necessary to the submitted instructional materials themselves. After considerable discussion, especially with regard to instances in which differences exist, the Panel makes it final determinations.

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- Recommendations on Promising and Exemplary K-12 instructional materials in science and mathematics are forwarded to the Secretary of Education.

The Future

It is not within the purview of the Expert Panel in Mathematics and Science Education to decide what should happen next. However, if it is the intention of Congress and the Department of Education to continue the effort to identify promising and exemplary programs in science and mathematics education, the Panel is in a position to provide the Department with suggestions—based on more than three years of direct experience—on how the materials evaluation process it developed can be improved upon.

Congress and the Department of Education may wish, however, to rethink the entire undertaking before launching another round. They might wish to entertain such questions as: How feasible is it to reach summary judgements on the quality and impact of programs, as opposed to providing careful descriptions of them? Can rigorous standards be applied without political backlash? Are adequate resources likely to be made available to do the job properly? Is such evaluation an appropriate government function? I am sure that many of the Panel members have well-formed opinions on such questions as these, though I doubt that they are in total agreement. In any case, if reconsideration were undertaken, their views would be worth taking into account.

Thank you for your attention. I would be pleased to answer your questions concerning the nature and operation of the Expert Panel in Mathematics and Science Education.

Appendix K For The Written Statement Of Rachel Tronstein, Student, University Of Michigan, Ann Arbor, Michigan.

I would first like to thank you for allowing me to speak before you concerning the very important issue of the Core-Plus curriculum. I believe that the Core-Plus Math curriculum has failed. It unwittingly comes up short of its lofty expectations, and ultimately does a great disservice to its students. While the program has always been well intentioned, I, and thousands of students like me, are prime examples of how the program simply does not work. I would therefore like to present to you a brief overview of my math education to date.

I first attended a private day school with an extremely 'traditional' math curriculum. I am entirely convinced that it was in middle school that I developed a solid understanding of the fundamentals of math.

I then entered Andover High School. Where I was enrolled in the accelerated Core-Plus curriculum. This line of study allowed me to complete first-semester college calculus during my senior year of high school. My classmates and I were the only Andover class to be placed in the Core-Plus curriculum for our entire four years at the school. Andover has since (because of pressure from students and parents) reintroduced traditional math classes to the school and students now have the option of the Core-Plus curriculum, a 'traditional' math curriculum, or both.

Throughout my entire high school career I received private tutoring for one hour weekly because my parents were concerned that I was not learning the necessary basic mathematics and concepts necessary for collegiate success. For this foresight, I cannot thank my parents enough.

I was also fortunate enough to attend Stanford University's summer session for high school students the summer of 1998. While at Stanford I took a remedial math class being offered exclusively to high school students enrolled in Stanford's summer session with an emphasis of basic mathematical theorems and procedures. This course was the Stanford's equivalent of Pre-Calculus, the same course that I had just completed months ago at Andover High School. It is interesting to note that the vast majority of material in that course was material to which I had never been exposed.

Currently, I am a first-year student at the University of Michigan. Fall term, I took first-semester Calculus. I received a grade of a B-, while in my other three University classes I received A's. Keep in mind that the University of Michigan has a very 'reform' math curriculum in comparison to other major universities. This program, like Core-Plus, encourages group work and discovery. Despite these similarities between the two curriculums, many Andover students still struggle in U of M mathematics, myself included, who had many advantages over most Core-Plus students.

Now that I have highlighted that Core-Plus has hindered the mathematical ability of myself and my peers, I would like to discuss both the specific problems and the advantages of the Core-Plus curriculum.

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I believe that the implementation of a program with goals similar to those of Core-Plus, used in tandem with a 'traditional' math program, would be of great benefit to students. However the Core-Plus curriculum itself, is counter-productive to math education for a variety of reasons.

First, and most importantly, Core-Plus failed to teach students basic mathematical skills required for post-secondary educational success. This program created a calculator dependent student population. Of course, students can compute answers to math problems using high-powered calculators. But this is done in such a way where there is little or no regard to the understanding of how or why that specific calculation is correct. It is impossible to further mathematical knowledge and ability without an understanding of the concepts that lie behind basic manipulations. One could never achieve collegiate academic success without an in-depth understanding of ninth-grade high school algebra I. Instead of fostering this calculator dependency, technology should be used to complement the textbook.

Students should use a graphing calculator to assist in learning, not in lieu of learning. Calculators should be used to create visual representations, to gain deeper understandings of the problem at-hand, which will then consequently enable students to later perform more advanced applications.

Another problem with the Core-Plus curriculum is that due to a limited understanding of the math underlying applications, students were often exposed to new ideas and concepts, but never felt as if they had mastered a specific topic. Because of this superficial skirting of key topics, students were merely made aware that different branches of math exist, but could not apply these concepts and abilities to future math problems or everyday situations. Furthermore, the various subjects introduced in the Core-Plus curriculum were not inter-related. At the end of the school year, students did not experience the sensation of mastery of a specific topic. Rather, students had sampled many different topics while studying none of these topics in-depth.

The final problem with the Core-Plus curriculum is that it produces a group of students ashamed of their mathematical ability and therefore causes students to shy away from university level math courses, as well as scientific courses requiring mathematical ability such as Chemistry and Physics. The goal of education is to open doors to students, not to close them.

In conclusion, while the goals of the Core-Plus curriculum are quite noble, the affects of the program fail the students. By failing to effectively teach basic mathematics, Core-Plus has created a student population that consistently tests into remedial mathematics courses at the college-level. Given these horrific results, the Core-Plus curriculum obviously has been and would be a disservice to students.

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Appendix L-The Written Statement Of David M. McIntosh, Representative from Indiana.

Statement submitted by Congressman David McIntosh
for the February 2 hearing on "Fuzzy Math"

Mr. Chairman,

Thank you for holding this important hearing. Frankly, it's shocking to me that Washington bureaucrats are pushing bad math on Indiana and all American children.

Far removed from our classrooms, so-called experts at the Office of Education Research and Improvement recommended flimsy math curricula to the Secretary of Education, who then gave them the rubber stamp and sent the official word that bad math was good for Hoosier children. Under the official endorsement, the Department of Education mailed this list to all school corporations in Indiana.

This math curricula called "new, new math" is so deeply flawed 200 mathematicians and scientists from leading universities sent a letter of protest because of "serious mathematical shortcomings" in the endorsed programs. In the opinion of these 200 scholars, mathematics instruction would be severely "dumbed down" if these ten programs were implemented in the nation's schools.

Some of these programs have been implemented in Indiana. Mathland, Everyday Mathematics and Connected Mathematics are on the Indiana state-approved textbook list. Many of the textbooks in circulation around the state rely on new, new math. The three school systems (Pike, Speedway, and Washington) in Marion County, which experienced the biggest increase in sixth grade math failure rates since 1997, share one textbook publisher. Not surprisingly, the middle school math book includes new, new math including a lesson on the rainforest. At Pike schools, sixth-graders receive Connected Math.

The system with the biggest improvement, Beech Grove, on the other hand, uses a back-to-basics Saxon math, and its failure rate improved from 45 percent in '97 to 28 percent. Saxon math has been adopted by 150 of Indiana's school corporations because of its high success rate. At Mary Bryan Elementary School in Indianapolis, failure rates on the state math test fell to 10 percent.

Saxon math is not one of the programs recommended by the Department of Education.

Math, like reading, is a necessary skill for students and the adults they will become. The Indiana State Test Education Progress (ISTEP) measures math abilities in grades 3, 6, 8 and 10. Passage on the final test requires a mastery of basic math skills.

More importantly, the mastery of mathematics is essential for those who wish to compete in the high tech industry. Currently, American companies must look abroad for math and science experts to fill jobs in the industry. Already, 70% of the "high tech" jobs in the Silicon Valley are being filled from outside our borders. As Indiana strives to take its place in the high tech industry, we will need students who have these skills.

Creative math, group experiencing, and rainforest calculations do not appear on the ISTEP. Nor

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will they help a student pass the SAT or the Act The new, new math curricula simply does not add up in the real world

Mr Chairman, I look forward to today's hearing and hope that the proceedings will spur responsible actions by the Department

Appendix M- Additional Materials Submitted for the Record.

REFORM VS. TRADITIONAL MATH CURRICULA:

PRELIMINARY REPORT ON A SURVEY OF THE GRADUATING CLASSES OF 1997 OF ANDOVER HIGH SCHOOL AND LAHSER HIGH SCHOOL, Bloomfield Hills, Michigan, CONCERNING THEIR HIGH SCHOOL MATH PROGRAMS AND HOW WELL THESE PROGRAMS PREPARED THEM FOR COLLEGE MATH

Gregory F. Bachelis, Ph.D.
Professor of Mathematics,
Wayne State University
Detroit, Michigan [1]

Dedication

This report, and the six months I spent working on the underlying survey, is dedicated to the students, past and present, of Andover and Lahser High Schools.

Acknowledgment

I would like to the thank several parents and others in the West Bloomfield and Bloomfield Hills School districts, and in particular Mark Schwartz, Ph.D., for their support and encouragement during the duration of this project

[1] address: Department of Mathematics, Wayne State University, Detroit, MI 48202
telephone: 313-577-3178, e-mail: greg@math.wayne.edu

STATEMENT OF PURPOSE

This survey was conducted to compare how high school students with differing high school math programs do in college. I conducted the survey in my capacity as a Professor of Mathematics at Wayne State University, where for 27 years I have taught and done research in mathematics, and more recently also in mathematics education and theoretical computer science. I conducted this survey as a public service to parents, students and others in the Bloomfield Hills School District, the West Bloomfield School District (where I live) and other districts where new programs have been introduced which have caused concerns among community members. It was also done as a service to the mathematical community, whose two main organizations[2] are closely following the evolution of these new math curricula and the effect they are having on incoming college students.

I sent the survey questionnaire (see below) along with a covering letter bearing the letterhead of the Department of Mathematics of Wayne State University. I gave my office phone number for people to call if they had any questions or concerns. There was also a stamped return envelope, addressed to my office, with which to return the survey. None of the above made it a "Wayne State Survey," nor did I imply in any of my communications with the people being surveyed that this was anything but my own research project. Nor was any implication given that Wayne State would endorse any of the research's conclusions.

In addition, the research was not funded by Wayne State University. The stamps on the return envelopes were paid for by interested parents. I did all of the work connected with the survey -- clerical, follow-up phone calls and e-mail messages, data transcription and the like -- and I was not given release time from my usual duties in order to accomplish all this.

The report that follows is preliminary in nature. Further analysis needs to be done on the data, and this is currently being done by professors at another university. However, the report *does* include all the comments made by all the respondents, with accompanying information supplied by them -- GPA's, SAT and or ACT scores, college attended, college major, etc -- in order to give the comments a context. Since I promised confidentiality to the respondents, I have blurred the contextual information, in a manner explained later, so as to preserve their anonymity. I have also, in a few cases, paraphrased or deleted portions of the comments in order to protect the identity of the respondent. In each case this is clearly indicated. None of the above actions detract in any material way from the information that they provided.

In closing, I wish to reiterate that this research project was performed by myself as an individual faculty member of Wayne State University, conducting a survey on what I considered to be a matter of public interest within the area of my professional expertise.

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[2] The American Mathematical Society and the Mathematical Association of America.

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The Advent of Core-Plus in Bloomfield Hills

The Bloomfield Hills School District (BHSD) is located in Oakland County, Michigan. It is a 25-square-mile area which is comprised of virtually the entire city of Bloomfield Hills, most of Bloomfield Township, a large portion of eastern West Bloomfield Township, and a small part of the city of Troy. The district has two high schools, Andover and Lahser, and three middle schools, West Hills, Bloomfield Hills and East Hills. The middle schools all house grades six through eight. West Hills feeds Andover, East Hills feeds Lahser, and Bloomfield Hills Middle School feeds both high schools.

In the fall of 1993, Andover High School began what would be a four year phase-out of its (non-accelerated) "traditional" math program, which had been as follows:

- Ninth grade --- Algebra 1
- Tenth Grade -- Geometry
- Eleventh Grade --Algebra 2
- Twelfth Grade - Pre-Calculus[1]

In its place the Core-Plus Mathematics Project (CPMP or Core-Plus) was installed, it is an integrated math program using modeling, simulation and cooperative learning, which makes extensive use of graphing calculators. Core-Plus was phased in on a year-by-year basis, so that by the 1996-97 school year it was the exclusive math program at Andover, with the exception of AP Calculus and AP Statistics.[2] The latter courses are typically taken in the twelfth grade by "accelerated students," by which I mean those who take Algebra 1 or Core 1 before the ninth grade.

"Integrated" or "Reform Math" refers at the high school level[3] to constructing the curriculum out of four "strands":

- Algebra and Functions,
- Probability and Statistics,
- Geometry & Trigonometry,
- Discrete Mathematics.

These are woven together for a three or four year curriculum, rather than being taught as separate courses.

Core-Plus was introduced at Andover in 1993 as a pilot project, which means that this was the first time it was used anywhere in an actual classroom setting. According to Professor Harold Shoen, Evaluation Director of Core-Plus, "The pilot test was designed mainly to provide feedback to the authors from teachers and students concerning what worked well, what did not and what improvements were needed."[4] In 1994 the field testing of Core 1 began in 36 high schools in Michigan and around the country. Core-Plus was originally intended as a three year curriculum. However, according to Marcia Weinhold, the Outreach Coordinator of Core-Plus, "During their senior year, [the non-accelerated Andover] students studied three prototype units for a possible fourth-year course that was envisioned by Core-Plus. Thus, the curriculum these students pursued was not a complete four-year curriculum."[5] The field testing for Core 4 started in the fall of 1998.

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[1] Another designation would be Trigonometry and Topics in Advanced Algebra.

[2] AP = Advanced Placement. Students taking these courses can then take AP exams, which, depending on their scores, entitles them to place out of college courses. There are two levels of AP Calculus courses, AB and BC.

[3] There is also "Reform Calculus" at the college (or high school) level, such as "Harvard Calculus". However, it cannot be described as "integrated," since it strives to cover less topics than traditional calculus.

[4] This is from a letter from Harold Schoen to me concerning the difference between pilot and field testing. The entire letter is in Appendix A I.

[5] This is from excerpts of an e-mail message sent by Marcia Weinhold, the excerpts can be found in Appendix A II.

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The Accelerated Students

A substantial portion of the Andover Class of 1997 consisted of students who had been accelerated in math, and hence had not taken Core-Plus. These students as a rule had taken Algebra I during the 1992-93 school year, while still in middle school. So when this group arrived at Andover in 1993, they rode the last wave of the traditional math sequence while the non-accelerated students rode the first wave of Core-Plus. Lahser, the other high school, stayed "traditional." Core-Plus was introduced at the middle school level, so that accelerated students destined for Andover could take it in the eight grade, in (I believe) January, 1994.

Controversy over Core-Plus

So, in June, 1997, the first class having completed four years of Core-Plus graduated Andover High School. Subsequently, reports of some of these graduates having difficulties on the math placement exams at the University of Michigan - Ann Arbor (UMAA) and Michigan State University (MSU) began to surface. On October 28, 1997, a joint meeting of the Bloomfield Hills and West Bloomfield School Boards was held to discuss reform math. After the featured speaker had finished the main part of his presentation, several parents and others took to the floor to express their thoughts and concerns about Core-Plus and about how this first graduating class was doing in college. I live in the West Bloomfield School District (WBSD), which had started introducing Core-Plus, and phasing out their existing math program, in 1995.[8]

I had participated in several meetings of my school board during the preceding year, at which Core-Plus was discussed, and I attended this joint meeting. After attending a number of additional meetings organized by parents, in both BHSD and WBSD, concerning the impact of Core-Plus, and mindful of the intense scrutiny the mathematical community is giving the evolution of such reform math programs, I decided to do a survey of the 1997 graduates of Andover, in order to determine their opinions about Core-Plus and to get as complete as possible a picture of their mathematical experiences since graduation.[9]

I surveyed the entire Andover class of 1997, the reason being that I did not know *a priori* who had been accelerated and who had not. Also, with the accelerated students I could study how well students with a traditional high school math background do in Reform Calculus courses such as "Harvard Calculus."[10] The latter is the flagship calculus course of UMAA; it is also taught at MSU, but on a more limited basis.[11] One of the main claims of Core-Plus and other programs of its type is that they are a better preparation for Reform Calculus courses than the more traditional curricula.[12]

The survey commenced in late April of 1998 and concluded in mid-September, as far as any activity on my part soliciting responses. The covering letter and survey questionnaire are given below in compressed form. (Most blank lines and some lines for answers have been deleted.) The original questionnaire consisted of three pages plus the optional section.

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[8] WBSD is adjacent to BHSD and contains the greater part of West Bloomfield Township, plus the cities of Orchard Lake Village and Keego Harbor.

[9] BHSD did a survey of Andover parents' opinions about Core-Plus. See Appendix B.

[10] "Harvard Calculus" is a product of the Consortium based at Harvard. There are several versions. The one used at UMAA is Calculus, Single Variable 2nd ed., by Hughes-Hallett, Gleason *et al*. There is a pre-calculus sibling, also used at UMAA: Functions Modeling Change: A Preparation for Calculus, by Connally, Hughes-Hallett *et al*. The publisher is J. Wiley & Sons.

[11] Course descriptions for some lower division math courses at UMAA and MSU can be found in Appendix D.

[12] I don't think that "Harvard Calculus" is "Core-Plus goes to College," as some would have you believe. For one thing, the former doesn't integrate a lot of topics, and there is some pencil and paper algebra. The two do have some things in common, such as extensive use of graphing calculators, cooperative learning and "real world" problems.

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Covering Letter and Survey Questionnaire

Wayne State University
College of Science

Department of Mathematics
Detroit, Michigan 48202
(313)577-2479
(313)577-7596 FAX

April 22, 1998

Dear _____,

I am conducting a survey of 1997 graduates of several high schools, including yours, who entered college in the summer or fall of 1997. We would appreciate your cooperation in this effort to evaluate how high school math programs are preparing students for college level mathematics. The results of this survey will be used for independent research regarding high school math curricula and individual names will be kept confidential. We are asking you for a few minutes of your time to complete the enclosed questionnaire and then to return it in the enclosed envelope. Please feel free to call me at my office at Wayne State at 313-577-3178, or to send e-mail to greg@math.wayne.edu, if you have any questions or concerns.

Thank you for your cooperation.

Gregory Bachelis, Ph.D.
Professor

MATH SURVEY

1. High School graduated from in 199__ _____ High School
2. High School GPA _____ Honors or Awards _____
3. Academic interests in high school: 1. _____ 2. _____
   3. _____ 4. _____ 5. _____
4. Scores on: SAT Math ___ Verbal ___ PSAT Math ___ Verbal ___
   ACT ___ PLAN ___ Other(specify) _____
5. Did you take any Advanced Placement tests? Yes No If so, please specify:
   Subject Score Year Subject Score Year
   _____ _____ _____ _____ _____ _____
6. Did you take any ACT or SAT prep courses? Yes No If so, please tell from whom and give dates:
   _____ _____
7. Math courses taken in High School. (Please fill in the appropriate box with the grade(s) received.)

Year	Alg 1	Alg 2	Geom	Trig	Adv Alg	Pre Calc	AB Calc	BC Calc	Core Plus 1	Core Plus 2	Core Plus 3	Core Plus 4	other(specify)	School Name
Fresh														
Soph														
Junior														
Senior														

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8. Did you receive any math tutoring while in high school? (besides SAT or ACT prep, if any.) Yes No If so, please give details on the next page. (Indicate if tutoring was private, provided in school, or by a commercial organization.)

I received tutoring in

Subject _____ Year _____ From _____

9. Did you participate in any summer math programs during the years you were in high school?

If so, please specify subject, year, and who sponsored them.

10. Did you enter college after graduating from high school? Yes No If no, or if you haven't taken any math courses or placement exams in college, please skip to question 16. Otherwise, please continue with questions 11 – 15.

11. Please specify any college math courses taken during the summer of 1997, or the 1997-98 academic year.

	Math Course	College/University	Grade	Text *
Summer '97				
Fall '97				
Winter '98				

*Please identify the text by listing the author or first author, if there are several. (e.g. Stewart, Thomas, Finney, Hughes-Hallett, Stein, Anton, Ostebee, Ellis, Edwards, Swokowski, Varberg, Larson, Dick, Wattenberg)

12. Did you take a math placement exam in college? Yes No If so, please tell where taken, the nature of the exam and your score and/or in what course you were placed.

13. Have you sought any math tutoring in college? Yes No If so, please give subject(s) tutored in and reason(s) for seeking tutoring.

14. What is your intended major?

15. Please answer the following two questions, when applicable, on a scale from 5 to 1.

a) Math courses I had in high school, other than calculus (if taken), helped me with my college math courses. (circle one)

5 4 3 2 1
very much somewhat not at all

b) Calculus I took in high school helped me with my college math courses. (circle one)

5 4 3 2 1 (Does not apply)
very much somewhat not at all

16. Please give any additional comments you wish to make concerning your math experiences in high school or college.

Thank you for your cooperation. There is an optional section on the next page. When you have completed this questionnaire, please return it in the enclosed envelope to:

Professor Gregory Bachelis
Department of Mathematics
Wayne State University
Detroit, MI 48202

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OPTIONAL SECTION

NAME _____ AGE _____ SEX M F

HOME ADDRESS _____

COLLEGE ADDRESS (if different from above) _____

May we contact you to obtain any further comments? Yes No

TELEPHONE NUMBER(S) _____

E-MAIL ADDRESS _____

In the eighteen months prior to my decision to conduct the survey, I had spoken out about Core-Plus. I was skeptical of the claim being made that it was suitable for all students, and I was critical of the fact that it was being implemented at certain schools to the exclusion of almost the entire previously existing math courses; the latter was the case at Andover and at West Bloomfield High School, the sole high school in WBSD. I felt qualified to speak out, since I have been a mathematics professor for over 30 years, and I have taught, at one time or another, all of the subjects that are included in these new integrated curricula. I felt that it was impossible to do these subjects justice by cramming them into a three or four year high school curriculum.

However, I do not feel that my voicing criticisms and concerns disqualified me from conducting the survey. Certainly I am capable of wearing different hats, and people doing surveys are entitled to have opinions on the subject under study. The key point is whether the survey is conducted in a fair and impartial manner. In this regard, note that the tone of the letter and questionnaire is quite neutral. There are no "loaded" questions. My follow-up phone calls and e-mail messages, encouraging people to respond, were also quite neutral in tone. I knew none of the those surveyed beforehand. Also, only a few of them attend Wayne State, which has about 17,000 undergraduates. For these reasons there was no pressure on them to respond. In any case, the respondents to this survey were not analogous to a jury being picked prior to a trial. They had had the course, so to speak.

The Control Group

In surveys of this type, there is a lot of "noise" that needs to be filtered out. If the Core-Plus graduates were the treatment group, then whom to use as controls? It would not have been fair to the Core-Plus group to use the accelerated Andover students as controls. Virtually all of the latter had taken calculus in the 12th grade, and it had been determined that they were among the better math students in their class - by exams, grades or other means - or else they wouldn't have been accelerated in the first place[1].

I decided to survey the 1997 graduates of Lahser, the other high school in the district, which had stayed traditional. I could then use the non-accelerated Lahser students, or perhaps the Lahser students who didn't take Calculus in the 12th grade (which includes the non-accelerated ones), as controls. With the remaining Lahser students I could study the same question as with the accelerated Andover students, concerning Traditional vs. Reform curricula. I could also compare these Lahser students with the accelerated Andover students, pre-Core-Plus.

I believe my choice of control groups was a reasonable one. The populations of the two high schools are similar socioeconomically, they are in the same school district, and one of the middle schools even feeds both of them. In 1993, when Core-Plus was introduced at Andover, students in

[1] Of course other factors enter into advanced placement, but it is safe to assume that the accelerated students were, on average, better in math than those who weren't.

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the district could in fact choose which high school to attend. I have only anecdotal evidence as to what effect, if any, the advent of Core-Plus had on traffic between Andover and Lahser, or out of the public system entirely to private schools such as Cranbrook Academy or Detroit Country Day School, or to parochial schools such as Marian High School or Brother Rice High School. In 1997, choice of high schools in the District was ended for the time being because of an imbalance in favor of Lahser.[14]

Survey Mechanics, Population Size and Rate of Response

In 1997, there were 228 graduates of Andover High School, and 258 of Lahser High School.[15] I determined the size of the population being surveyed and response rate of each high school as follows:

Andover High School

- 1997: 228 total graduates
- one exchange student -- returned home
- at least four other students had left the country
- probable valid addresses for all but one of the remaining students

Therefore student population size = 228 - 1 - 4 - 1 = 222

- 112 total replies

Response rate = 112 total replies/222 population size = 50%

Lahser High School

- 1997: 258 total graduates
- one exchange student -- returned home
- probable valid addresses for all but six of the remaining students

Therefore student population size = 258 - 1 - 6 = 251

- 75 total replies

Response rate = 75 total replies/251 population size = 30%

In late April and early May, the questionnaire and covering letter were mailed to all 1997 graduates from both high schools. A stamped envelope with my return address at Wayne State was included. The initial mailing was followed up by phone calls or e-mail messages (when e-mail addresses could be determined). These follow-up contacts were made by me, so that there would be consistency in the messages being sent by e-mail or left on phone answering machines, and in the phone conversations. Based on these contacts, a second questionnaire was often dispatched, as its predecessor had been misplaced or discarded for sundry reasons. I have communicated in the ways indicated above with over 80% of the 473 graduates (or in some cases, family members) who were being surveyed.

One can only speculate as to the reasons why some graduates did not respond to the survey. The non-respondents might include those who:

- for one reason or another, never received the questionnaire;
- were apathetic, busy, etc.;
- objected to a survey in the first place;
- didn't want to revisit high school issues.

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[14] Detroit News, 1-27-97
Birmingham Bloomfield Eccentric, 6-12-97

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SOME WORDS OF CAUTION

I wish to make the following three points.

1) I want to stress that I was not trying to determine how well the various curricula were taught. This iscertainly an issue, especially with a radical new curriculum like Core-Plus. I was simply trying to find out how the various curricula, as taught, prepared the students for college math, their reaction to their high school math experiences, and also how much extra help, such as tutoring, they sought.[16]

2) The information is only that provided by the respondents, and has not been independently verified. They were promised confidentiality by me, and I believe they made a good faith effort to give accurate answers to the questions. Certainly a number of the comments were quite candid.

3) Many schools besides Andover High School have phased in new math programs like Core-Plus, mainly in response to the promulgation of the 1989 NCTM Standards[17], although some of these schools have also kept the traditional track, thus allowing for "choice" and for comparison of the two curricula.

SOME STATISTICAL ANALYSIS

The Andover respondents fall naturally into two groups:

- I: non-accelerated (Core-Plus), and
- II: accelerated (virtually all of whom took Calculus).

The Lahser respondents fall naturally into three groups, since a lot of the accelerated students did not take AP Calculus, although a number of them did take AP Statistics.. These groups are

- I: non-accelerated,
- II: accelerated, no Calculus, and
- III: accelerated, with Calculus [18]

The answers to 15a) of Andover I are compared to those of Lahser I and II in the following table. Recall that question 15 was:

15. Please answer the following two questions, when applicable, on a scale from 5 to 1

a) Math courses I had in high school, other than calculus (if taken), helped me with my college math courses. (circle one)

5 4 3 2 1

very much somewhat not at all

b) Calculus I took in high school helped me with my college math courses. (circle one)

5 4 3 2 1 (Does not apply)

very much somewhat not at all

We have the following results

Group	Mean response	Standard Deviation	Number of Responses
Andover I	1.78	0.94	53
Lahser I	3.39	1.09	23
Lahser I&II	3.46	1.05	35

Table I: Answers to 15a) for Andover I, Lahser I, and Lahser I&II

In retrospect, I should have asked a question about how well they felt their high school math courses prepared them for college science courses, since this is a non-trivial issue as well.

The Curriculum and Evaluation Standards of the National Council of Teachers of Mathematics. They are currently under revision.

Recall that "accelerated" refers to people taking Algebra I (or Core 1 in subsequent years at Andover) before the ninth grade.

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Assuming linearity of the response scale, this means that the Lahser students without calculus thought their high school math was approximately twice as helpful with college math than the Andover Core-Plus students did.

I should mention that a number of respondents appear to have been confused about 15b) and to have thought that the word "calculus" applied to college rather than high school. So, for example, all of the respondents in the above three groups should have circled "Does not apply" in 15b), and this was not the case. The answers to 15a) and 15b) for Andover II and Lahser III are now compared.

Group	Question	Mean response	Standard Deviation	Number of Responses
Andover II	15a)	3.81	1.13	36
Andover II	15b)	4.01	1.34	35
Lahser III	15a)	3.50	1.24	28
Lahser III	15b)	3.80	1.30	30

Table II: Answers to 15a) and 15b) for Andover II and Lahser III

This means that all groups who had high school calculus answered between 3.5 and 4 on average, when asked about the helpfulness of high school calculus or of high school math before calculus, and that Andover was slightly more generous than Lahser. Considering both tables, we see that the average answer of each of the groups, except Andover Core-Plus, was roughly 2 times more than Andover Core-Plus.

Further statistical analysis of the data is needed, and this is currently being done by several professors at Stanford University.

The Comments

I have decided to report all the comments verbatim, subject to the following protocol. I have corrected spelling errors and expanded abbreviations. In a few instances I have deleted a word or phrase to protect the confidentiality of the respondent. These deletions are denoted "[...]". In a few cases I have added a few words or paraphrased. Such paraphrasing or additions are enclosed in square brackets.

I have given the answer and accompanying remarks to question 13 about math tutoring in college, when there were remarks made that were worth noting, since this question did indeed generate a lot of comments. I have also included those parts of answers to question 12, which asks whether a math placement exam was taken in college, that relate to the score received and the resulting placement, since this is a matter of some controversy.[19] I have also included affirmative answers to question 8 about math tutoring in high school, and excerpts from the answers given, since this too has been a matter of some interest; to wit, did Core-Plus generate more than the "usual" amount of math tutoring. In this regard, I have included affirmative answers to question 9 about summer programs when they relate to summer school as opposed to summer "math camps." In addition, I have given the answers to question 15a) for Andover I and Lahser I&II and to questions 15 a) and b) for Andover II and Lahser III.

Besides the above, in order to give the comments more context, I supply some information about the respondent, blurred somewhat so as to preserve anonymity. This "blurring" is accom-

[19] See Appendix A.1

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plished as follows. High School GPA's, and SAT and/or ACT scores, when given, are reported in a certain range, rather than by exact value.

Colleges, except for UMAA (The University of Michigan - Ann Arbor) and MSU (Michigan State University), are reported by category, these being:

Michigan-Public,
Non-Michigan-Public,
Private,
Private-regional, and
Other (specialty schools, no college attended, or college unknown).

College majors are also reported by category, these being:

Science (which includes mathematics and psychology),
Engineering,
Business,
Education,
Nursing (which includes medical technicians and physical therapy),
Design,
Fine & Performing Arts,
Pre-professional (which includes architecture),
Communications (which includes journalism),
Social Science, and
Liberal Arts[7]

Unfortunately, I cannot supply an indication of grades in high school math classes, because a lot of respondents, in answering question 7, merely put X's in the grid to indicate which courses they took, without listing the grade received, as was requested. In some cases this was no doubt because they couldn't remember the actual grades. I don't see the purpose of supplying information which can only be done so sporadically.

I want to make it very clear that I did not solicit comments beyond what people wrote in their returned questionnaires. In a few cases respondents sent e-mail messages with comments prior to sending in their questionnaires, and I have included these where they were not duplicated by the written comments. In a number of cases, during the course of my phone calls subsequent to the mailing of the questionnaires to encourage people to respond, graduates or their parents gave opinions. In these cases, I said that I could not do the survey over the phone, and I encouraged them to send in their questionnaires. I made no written record of such conversations.

A majority of the respondents chose to answer the Optional Section and to answer "Yes" to the question asking whether they could be contacted for additional comments. In these cases I thanked them, by phone or e-mail, for responding to the survey, and I encouraged them to get other graduates to respond. In some cases I also sought clarification to their answers to one question or another, and in a few of these cases, comments were made by respondents which I then added to their written comments (and these additions are so noted), but as I said above, I did not solicit comments beyond what the respondents had chosen to write.[8]

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[7] Since Social Science is considered part of Liberal Arts, when someone gives two majors, one in the former and one in the latter but not the former, they are reported simply as Liberal Arts.

[8] The Comments in Context are reported in a separate section following this one.

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Some Conclusions

I will let the reader draw his or her own conclusions as to the validity or reliability of the comments. One conclusion I wish to make is that, if some of the Lahser comments give the reasons why curricula such as Core-Plus have been developed to try to make mathematics more meaningful and accessible, then surely a preponderance of the Andover comments - even some by people who were not in the program - indicate that the cure is much worse than the disease for students who need to take additional math courses in college, and perhaps for others.

The other matter I would like to comment on is the performance of Core-Plus graduates on the placement tests at UMAA, MSU, as well as other colleges. A lot of them complained that they did not do well because of their lack of knowledge of basic algebra, and some said they did not do well even in the courses they *were* placed into. Now it is all well and good to say that people are just having a bad day when they do poorly on a placement test, but as someone who has taught remedial algebra for more years than I care to remember, let me assure you that there is a big difference between learning basic algebra and then forgetting most or all of it, and never having learned it at all. Core-Plus appears to have created a new category of students who land in remedial math courses - courses which were not designed with such students in mind.

Further Work

This is after all a preliminary report, so I welcome any suggestions or corrections, and I will make appropriate changes where indicated. As I mentioned above, more analysis of the data is being carried out. In this report I have chosen not to study in detail the issue of high school math vs. reform calculus in college, however some of the comments of the students do shed some light on this.[3]

There are also other groups that should be surveyed. For example, the accelerated group that graduated from Andover in 1998 after 4 years (or maybe 3 and 1/2) of Core-Plus followed by one year of AP Calculus should be studied. I tried to get information about this group, but I only have a few anecdotes about how they are doing. Also, non-accelerated groups a year after graduating who had field tested Core-Plus, as opposed to pilot testing and testing prototypes, could be studied. West Bloomfield High School now has a hybrid version of Core-Plus, in which certain Core modules have been deleted in favor of algebra drill.[4] (The courses being taught at that high school this year are one year past field testing, except for Core 4.) Groups having had this type of curriculum could be studied as well.

I leave such surveys to others, as I am not up to an encore.

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[3] See e.g. the comments in Andover 40, 42, 83, 107, 148, 5, 35, 138, 232; Lahser 46, 96, 62, 127.

[4] I don't think that injecting algebra drill is a viable solution to what I consider to be the problems with Core-Plus, in part because of the vast differences in approach of Core and the traditional method.

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Please note. I have included all responses. Even those which had no comments. The first line contains GPA, SAT, ACT, college, and college major information. If comments were given in response to item 16, then they start on the second line, preceded by a "bullet" and written in boldface. Successive items are labeled. Other comments may be highlighted in italics or boldface.

The Comments in Context

Andover Group I Students {non-accelerated (Core Plus)} who made Comments about Core Plus'

Andover 4. 2.75-3.25; SAT M 400-500 V 500-600; Michigan-Public; Education

- **Core Plus was a waste of my time. I have very few math skills, and none of them helped me with Algebra I in College.**

Math placement exam? Yes. I suppose I didn't pass because I was placed in 110, the second lowest.
Math tutoring in college? **Yes. I have never understood Algebra because of Core Plus math in High School. I went to the tutor lab 3 times per week and I still did poorly.**
15a) 1

Andover 8. 2.75-3.25; SAT M 500-600 V 500-600; ACT 18-20; Michigan-Public; Business

- **With the new program of math at Andover I did not feel prepared to enter the level I was placed at in the University.**

Math placement exam? Yes. I was placed in Intermediate Algebra.
Math tutoring in college? *No. I decided that I should prepare myself by taking a couple of math classes at a community college before I go and take it at [my university]*
15a) 1

Andover 14. 2.75-3.25; ACT 24-26; Michigan-Public; Business

- **[Core Plus] was probably the most horrible experience I have ever gone through in high school.**

Math tutoring in high school? Yes. 1996.

Andover 16. 3.25-3.75 ACT 24-26 UMAA Communications

- **Should not use notes for test, because you can't at college.**

Math tutoring in high school? Yes. Math. On and off throughout High School
Math placement exam? Yes. I got a 6%
15a) 1

.Andover 17. 3.75 - 4.0 ACT 21-23 UMAA Social Science

- **Helped me learn new way of thinking, but high school math should have taught more basic math concepts**

Math tutoring in high school? Yes. Basic Math. 1995-96.
Math placement exam? ***Yes. Got 0/10 because knew no traditional math.***

Andover 19. 3.75-4.00 ACT 18-20; UMAA Communications

- **I hated Core Plus; thought it was a waste and very boring.**

Math placement exam? Yes. 29%. pre-calc.

Andover 20. 2.75-3.25; SAT M 500-600 V 600-700; Michigan-Public; Fine & Performing Arts or Education.

- **I thought math would be really easy at [...] because [...]. But High School did nothing for me. It seems all I took from High School math was how to use the TI-82.**

Math placement exam? Yes. I placed into Normal
15a) 2

Andover 27. 2.75-3.25; ACT 21-23; Michigan-Public; Design

' See also Appendix A II.

Please note I have included all responses. Even those which had no comments. The first line contains GPA, SAT, ACT, college, and college major information. If comments were given in response to item 16, then they start on the second line, preceded by a "bullet" and written in boldface. Successive items are labeled. Other comments may be highlighted in italics or boldface.

- **Core Plus has got to be one of the worst math programs. We were never taught any of the basics and most are suffering in college math courses**

Math tutoring in college? **Yes. College Algebra, because I did not learn (was not taught) in high school.**

15a) 1

Andover 31. 2.75-3.25; SAT M 400-500 V 500-600; ACT 21-23; MSU Communications

- **The math I received in high school did not prepare me for the math I received in college. I was expected to know many things in my college course that I do not feel the Core Plus program prepared me for. I was very behind in my knowledge of mathematics upon entering my college math course [Intermediate Algebra].**

Summer School. Before freshman year. First-level Algebra.

Math placement exam? Yes. I [had] a raw score of 5 right and was placed in the lowest level of math, 1825 [Intermediate Algebra].

15a) 2

Andover 40. 3.25-3.75; ACT 24-26; UMAA Business

- **Core Plus focused on theory instead of numbers whereas calculus at U of M focused on numbers [and] then explained the theory behind it.**

15a) 1

Andover 42 3.75-4.00 UMAA Undeclared

- **Even with having an excellent teacher and being self-motivated I felt unprepared. Core Plus needs to focus more on teaching basic skills before diving into applications. The program was similar to calculus and pre-calc at Michigan in terms of group homework and story problems - but fundamental concepts need more attention!**

Math tutoring in college? Yes. Made use of the math lab (free tutoring) while taking calculus to get help with new concepts and prevent being behind.

15a) 3 (pre-calc) 1 (calculus) [Count as 2 for statistical analysis.]

Andover 43. 2.75-3.25 Other Unknown

- **The math program was good and bad. It tried to apply math to real life - but it didn't make a great attempt. I live on my own in [...], use math in all my taxes and bank account things and I learned all that outside of the math program.**

Andover 45. 2.75-3.25 ACT 18-20; Michigan-Public; Social Science

- **The reason I have not taken any math courses in college is because the math I learned in high school does not apply to college math. I used the TI-82 for linear programming and colleges do math by hand which is very tedious. Colleges all need to change to the new math.**

Andover 53. 2.75-3.25; SAT M+V 1000-1100 (better in verbal) MSU Science

- **I feel let down by the integrated math program. I felt as if there was a great deal of skills they assumed us to already have.**

Math placement exam. Yes. Lowest math class for no credit.

Math tutoring in college? ***Yes. Algebra, I was not taught a lot of the "basics."***

15a) 2

Andover 54. 3.25-3.75; ACT 24-26; Non-Michigan-Public; Communications

- **The math program at Andover sucks, and f____d me in my first year at [the] university and did not prepare me for [the] ACT at all.**

  Math tutoring in college? **Yes. Trig, had no high school background.**

  15a) 1

Andover 55. 3.25-3.75; ACT 21-23 MSU Nursing

- **The concepts I learned were interesting but did not prepare me for standardized tests or, more importantly, for college mathematics.**

  Math placement exam? Yes. My score (8, I think) placed me into remedial math (1825)

  Math tutoring in college?. **Yes. Math 103 (College Algebra). Did not learn adequate algebra concepts in high school. Therefore I was extremely behind.**

  15a) 2

Andover 57. 3.25-3.75; SAT M 500-600 V 500-600; ACT 21-23 MSU Business

- **My math experience in high school was terrible. I used to be an excellent math student in middle school, but when I took Core Plus Math my math skills went downhill. It is a terrible program. I wouldn't recommend it to my worst enemy.**

  Math tutoring in high school? Yes. Core Plus Math. 1996

  Math placement exam. Yes. [results not given]

  Math tutoring in college? **Yes. Math - I was having trouble keeping up with all the work [in Finite Math]. I didn't understand half of it due to my terrible high school math program.**

  15a) 3

Andover 60. 2.75-3.25 ACT 18-20 MSU Education

- **I believe that the Core Plus program was <u>horrible</u>. I was not prepared for college math courses, and I am now struggling in a course I am attending for the next 7 1/2 weeks at OCC. My scores on my ACT were all high except for math, which brought my overall score down.**

  Math tutoring in high school. Yes. Math (Core Plus). All 4 years

  Math placement exam? Yes. I was placed in 1825, which is a non-credit class, but I needed it to take 103 (which is a basic algebra class).

  Math tutoring in college? *Yes. It was for 1825 [Intermediate Algebra], and I received help from [another] student, who [was] a math major. I needed help because I was lost in the class.*

  15a) 1

Andover 63. 3.75-4.00; ACT 24-26; MSU Business

- **I think Core Plus is the worst math program I've ever been forced to take. Traditional math courses are what high schools need to teach to prepare kids for college.**

  Math placement exam? Yes. I placed into Math 120 but chose to begin in 103[College Algebra].

  15a) 1

  During subsequent phone conversation: *The algebra class I took in high school was the only thing that helped in college math.*

Andover 64. 3.75-4.00; SAT M 700-800; V 700-800; ACT 27-29 UMAA Science

- **Core-Plus math stinks. It did not help me as much as other courses would have and should have. Do your best to end it.**

  Math tutoring in high school? Yes. Algebra. 1995

  Math placement exam? Yes. Scored in the 20th percentile.

  15a) 3

Andover 68. 2.75-3.25 ACT 21-23 MSU Communications.

- **Because of the Core Plus Program I am completely unprepared and have no way to understand college math. I have to take Math 115 (High School Math) at OCC during the summer [which is]**

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equivalent to 1825 [Intermediate Algebra] at MSU for no credit toward graduation in order to go forward into math courses at MSU. I have been extremely frustrated and disappointed with the "math" I took in High School.
Math tutoring in high school? Yes. 1994-97.
Math placement exam? Yes. I do not remember the score, but it was low. I placed into 1825 [Intermediate Algebra].
Math tutoring in college? *No. I was not going to take a math course because I was so unprepared.*
15a) 1

Andover 70. 3.25-3.75 ACT 21-23 Michigan-Public; Business

- **I did very well in all my years of high school and got A's and B's in all my math courses, but when I tried taking 090 [Intermediate Algebra] at [my university], I was totally lost and didn't know even the most basic concepts. I took a W for the class and have made arrangements with the head of the Math Department to retake the course under his tutoring next fall.**

Math placement exam? Yes. Low, below avg. score. Placed into Math 090.
Math tutoring in college? *Not yet, but I'm pretty sure I'll have to.*
15a) 1
During subsequent phone conversation. **My high school math helped me in my Statistics course.**

Andover 73. 2.75-3.25; SAT M 500-600 V 600-700; ACT 21-23 UMAA Fine & Performing Arts

- **I'm not going to take and math courses in college because, although I did well in High School math, I feel I don't understand basic math concepts well enough to keep up in college.**

Mathematics courses during 1997-98 school year. *None taken. Don't feel prepared enough.*
15a) 1

Andover 74. 3.25-3.75; SAT M 400-500 V 600-700; ACT 21-23; UMAA; Communications

- **Andover Core-Math Program does not prepare a student entering college the sufficient basic skills that are necessary to function within college level courses.**

Math placement exam? Yes. Placed in the lowest math possible.
15a) 1

Andover 77. 2.75-3.25; ACT 21-23 MSU Undeclared (maybe Communications)

- **I liked how we did group work a lot of the time, and the material we were to be taught was taught in a very small amount of time. Like, I think we learned algebra for 3 days. It takes practice, but we did it anyway in 3 days. That doesn't work.**

Math placement exam. Yes. It was kind of easy and I passed. I was placed into Mth 103, 116 or 132.
15a) 3

Andover 83. 3.25-3.75; SAT M 500-600 V 700-800; ACT 27-29; UMAA Social Science/Science

- **I enjoyed my high school math class because it was neither overly difficult nor frustrating. However, it did not prepare me sufficiently for standardized tests such as the ACT/SAT and college placement exam. My high school math did somewhat help me in college. My problem in college math [Pre-Calc] was not so much about poor preparation as it was about poor teaching. My GSI was very difficult to understand. He spoke little English and drew incomprehensible diagrams on the blackboard. Also, the grading of exams was somewhat questionable.**

Math placement exam? Yes. I placed in the 6th percentile. Therefore I was placed in 105 (pre-calculus).
15a) 3

Andover 84 2.25-2.75 Other

- **I am currently working and feel that I cannot even do basic math calculations. I am missing too many fundamentals**

Andover 91 2.25-2.75 MSU Education :

- **Andover's math program was not helpful at all.**

Math placement exam? I was placed in Math 1825 [Intermediate Algebra].
15a) 1

Andover 94. 3.75-4.00; SAT M 500-600 V 700-800; ACT 24-26; Michigan-Public; Pre-Professional

- **The Core math program has given me a weak math background.**

Math tutoring in high school? Yes. 1996-97.
15a) 1

Andover 95. 3.25-3.75 SAT M 500-600 V 500-600 UMAA Science

- **I am concerned with the direction math has taken in Core classes. Math has become second nature [read "secondary"] to learning to write about math. I am embarrassed and not the least bit confident with my math ability. I am upset that I was ever placed in a Core class!**

Math placement exam? Yes. Math 105 (pre-calculus).
15a) 3

Andover 100. 2.75-3.25 ACT 24-26 MSU Communications

- **When it comes to my mathematical ability here in college, I feel second compared to other students. My high school is a nationally recognized institution and while I do feel as if I've been well prepared in other areas, I feel that the Core-Plus math courses were a waste of four years.**

Math placement exam? Yes. Placed in MTH 1825, an algebra class for no credit (towards graduation requirement[s].)
Math tutoring in college? Yes. MTH 1825 Visit[ed] Math TA (teaching assistant) during office hours for help on class material..
15a) 2

Andover 107. 3.25-3.75 SAT M 500-600 V 500-600 UMAA Social Science

- **My math courses in high school barely prepared me for college. I was very behind when it came to competitiveness and dealing with the difficulty of taking a college-level Math course. [Respondent took Math 105, Pre-Calc.] I was taught difficult math ideas in high school but was never taught the fundamentals!**

Math placement exam? Yes. Placed in the 5th percentile.
Math tutoring in college? Yes. Repeatedly went to office hours for special attention from my teacher, a GSI.
15a) 2

Andover 112 3.75-4.00; SAT M 500-600 V 600-700; ACT 24-26; Non-Michigan-Public; Fine & Performing Arts

- **My math experience in high school was not advantageous. Although I received good marks in the courses, they did not help prepare me for the SAT or ACT . I can also positively affirm that I remember almost nothing from those courses (Core-Plus). I am very fortunate that I do not have to take any seriously math based courses in college. My major does not require me to do so. The Core-Plus math program did not help me remember the elements and forms of algebra, calculus, geometry and trigonometry for the long term. Also, there was no permanent index to the formulas and equations used. If I needed to look back on something, I could only depend on my own notes. I guess no one took it into consideration the fact that students might miss a few things in their note taking.**

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I learned the math and I studied it. The key, however, is that I learned it the way the Core-system presented it to me. Years of solving long word and statistical problems does not seem to help on the SAT's. In the SAT booklet you will find a few letters (A, b or c), a few numbers, and possibly a chart. There are no words and no real-life situations presented. I've never been superb at math, but Core-Plus didn't make me learn and retain it any better.

Thankfully my parents read to me as a child. I can read, write and spell very, very well. A skill I desperately needed for those standardized tests.

Andover 126 2.75-3.25 ACT 24-26 MSU Business

- **At Andover High School I was required to take Core-Plus when I was a freshman. The class has not prepared me for anything in college. I am currently finishing a math class at MSU that I will not receive credit for [1825]. In this class we only use our calculators to solve simple computations. It is not acceptable to give answers produced by advanced calculator programs as we were taught in high school. By participating in the Core-Plus program I was essentially handicapped when I went to college. I don't know where this survey will take you, but it seems to me that a positive effort is being made [by this survey] to evaluate the current situations. Please keep me informed of your progress.**

Math tutoring in high school? Yes. Only to prepare for a test that contained subjects that I did not understand. I went, probably once a month.
Math placement exam? Yes. Placed into Math 103 [College Algebra]
Math tutoring in college? Yes. Tutoring for everything. I have much difficulty understand[ing] math.
15a) 1

Andover 128 2.75-3.25 SAT M+V 900-1000 SAT 18-20 MSU Business

- **I received A's B's and a C in math [in high school], but I still didn't know anything in the lowest Math class at State.**

Math placement exam? Yes. I placed [by?] one point into regular Algebra, but they advised me to go into Intermediate Algebra.
15a) 2
Content of an e-mail message sent in response to an e-mail query of mine.

I never received the questionnaire and would like to take it. I will also tell you this, Not one person who took the Math Core program is even close to prepared for college level math, not even the Intermediate Algebra at MSU (unless they received help from a tutor, or took extra math classes at OCC) I feel the Math Core Program at Andover is the (excuse my language) dumbest thing the Bloomfield Hills School District has ever done. Most students who graduated from Andover do not even know simple Algebra. I find it idiotic that a school like Andover who has a 99% graduation record and about a 95% future college bound body changes their math program to one for students planning not to go to college.

Last year, a math teacher at Andover told his Calc. class that this was the last year Andover had any chance of doing good in the Quiz Bowl because of the new math program. He then turns around and tells our class that the Math Core program is great and will prepare everyone for college. Excuse my language but that was a bunch of bull %$&#. As you can see, I am a little bit sour about this whole thing. As you will see if you haven't found out yet, is that Andover screwed everyone who was forced to take the Math Core program, and is costing parents extra money on math tutors, classes that shouldn't be needed (like MTH 1825 at State)...etc. It also wastes students' time. I must go, but if you need anything else just ask.

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Andover 132 3.25-3.75 ACT 21-23 MSU Business

- **The Core Plus program was a poor excuse of a math program. Because of it, I am well behind all other students in Math at MSU, and have struggled to the point where I have now failed a math class.**

Math placement exam? Yes. I was placed in algebra.
15a) 1
Content of an e-mail message sent in response to an e-mail query of mine.

I seem to have misplaced the questionnaire that you sent. You can send me another if you like, but I will tell you right now that I am going to tear the math class to pieces. I am going to give it all the lowest marks because it was the most ridiculous class, that made the majority worse math students than at other schools, and has been the primary factor behind the failure of many students in math thus far in college.

Andover 133 3.25-3.75 SAT M 600-700 V 300-400 ACT 18-20 MSU Education

- **Math has been my strong subject. I could simply understand whatever I learned in math classes. So I never spen[t] [a] long time studying for math, even before exams.**

Math placement exam? Yes. The score was 18. Placed into MTH 201, math investigation[s].
15a) 4

Andover 145 2.25-2.75 ACT 21-23 Michigan-Public Pre-Professional

- **I think the Core Plus program does not help especially when you get to college.**

Math tutoring in college? Yes. Failing class, was not able to keep up with other students.
15a) 1

Andover 146 2.75-3.25; ACT 21-23 Michigan-Public Undecided

- **Andover math left me totally unprepared for college math.**

Math tutoring in college? *Yes. Trouble with Intermediate Algebra.*
15a) 1

Andover 148 3.25-3.75 SAT M 700-800 V 500-600 UMAA Undecided

- **I didn't really like the new [math] program we had in our high school. It didn't prepare me well for college calculus.**

15a) 1.5

Andover 150 3.25-3.75; SAT M 400-500 V 500-600 ACT 21-23 MSU Business:

- **I was not properly prepared for College Math from the Core Plus program. I never completely grasped the concept of Algebra in college because of a lack of experience in high school.**

Math placement exam? Yes. Placed into Algebra I.
Math tutoring in college? *Yes. Algebra I - did not understand material.*
15a) 2

Andover 152 3.25-3.75 MSU Liberal Arts/Business

- **I feel that the preparation I received in High School with Core Plus was hardly adequate enough for College Algebra. I struggled with many basic mathematical principles that I should have mastered in High School.**

Math tutoring in college? *Yes. Algebra, because my High School Program was so weak and I was having a hard time with Algebra.*
15a) 1

Andover 154 2.75-3.25 SAT M 400-500 V 500-600 ACT 21-23 MSU Business

- **The Core Plus system was horrible to my learning. I don't know one person who was happy with it besides the teachers.**

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Math placement exam? Yes. I placed in College Algebra.
15a) 2

Andover 159 2.75-3.25 SAT M+V 900-1000 ACT 24-26 MSU Pre-Professional

- **I sometimes regret that I hadn't taken math very seriously over the past years. I hear from my graduat[ing] class that Core Plus did not help in their college math courses. I am planning to go into the [...] field so I am going to take math more seriously.**

Summer School. Algebra. 1996.

Andover 162 2.25-2.75 ACT 21-23 Michigan-Public Social Science
Math tutoring in college? *Yes. Math, because I was not adequately prepared*
15a) 1

Andover 163. 3.25-3.75; SAT M 600-700 V 600-700; ACT 27-29; Michigan-Public; Business

- **Core Plus taught me math well; however, it did not teach me how to show my work. Because of that I failed college math.**

Math placement exam? No. ACT placement.
15a) 3

Andover 164 3.25-3.75 ACT 30-34 MSU Science/Pre-Professional

- **Core Plus was useless. It helped me very little for college level calculus.**

Math tutoring in high school? Yes. Just 2 sessions prior to ACT.
Math placement exam? Yes. Received a 36 out of 40.
15a) 2

Andover 168 2.25-2.75 Other

- **I don't think the Math was any good. It's like going to a restaurant and sampling every item from the buffet table and not having any main course.**

Math tutoring in high school? Yes. Junior year.

Andover 178 3.75-4.00 ACT 24-26 UMAA Social Science

- **My high school math program stunk. Andover should be ashamed for hindering the futures of their students.!!**

Math tutoring in college? Yes. This semester because I am not comfortable with my math ability.
15a) We'll see!!

Andover 187 2.75-3.25 ACT 18-20 MSU Pre-Professional

- **The Core Plus math program is the worst thing I could have taken. I learned nothing I needed to know for college !!!**

Math placement exam? I placed into the lowest, Math 1825 [Intermediate Algebra]. I scored a zero.
Math tutoring in college? Yes. Intermediate Algebra by my math teacher there.
15a) 1

Andover 189 3.25-375 ACT 24-26 MSU Education

- **The high school math program was good. The problems arose because colleges haven't restructured their math programs accordingly.**

Math tutoring in high school? Yes. 1996-97
Math placement exam? Yes. Scored below primary math course. Had to take 1825 which is no credit towards graduating.
15a) 3

Andover 190 3.25-3.75 ACT 27-29 Private Science

- **High school math was easier to apply to situations outside of the class. College math [Respondent took College Algebra] has been completely abstract.**

15a) 3

Andover 191 3.25-3.75 SAT M+V 1100-1200 UMAA Business.

- **I have never been so disappointed in a type of schooling such as this course. I am the epitome of mathematical ignorance in a top ten [high] school with a 4.0 in math.**

Math tutoring in high school? Yes. 1996-97. Also audited Algebra classes at OCC, 1996-97.
Math placement exam? Yes. Pre-Calc.
Math tutoring in college? *Yes. My Pre-Calc. Class has far surpassed my capabilities and understanding in Math.*
15a) 1

Andover 204 3.25-3.75 ACT 21-23 UMAA Nursing

- **The math program in high school did not sufficiently prepare me to continue in college level mathematics!**

Math placement exam? Pre-Calc - failed - 4%
15a) 3

Andover 205 2.75-3.25 ACT 18-20 MSU Education

- **I took Core Plus all through high school and it did not prepare me at all for college math. I should have learned basic algebra in the 9th grade and because of this program, I learned it this past year. I know that many others also struggled in college math and ended up in low math classes because of Core Plus**

Math tutoring in high school? Yes. 1995-96.
Math placement exam? Yes. I was placed in Math 1825 or Intermediate Algebra.
Math tutoring in college? **Yes. I received tutoring in College Algebra, because I had never learned the material in high school.**
15a) 1.5

Andover 206 3.25-3.75 SAT M 500-600 V 500-600 UMAA Social Science

- **I'm horrible at math and do not intend on taking any math courses in college. However, I think it has much more to do with my interests and little to do with my high school math background.**

Math placement exam? Yes. I fell into the 0 - 1 percentile (the last percentile).
15a) N/A

Andover 207. 3.75-4.00; SAT M 500-600 V 500-600; ACT 27-29; UMAA; Science
Math placement exam? Yes. Placed into Precalculus. Scored 1- %tile.
Math tutoring in college? **Yes. Algebra, through the free tutoring through the University. I didn't knowalgebra.**
15a) 1.5

Andover 209 3.25-3.75 SAT M 400-500 V 500-600 MSU Pre-Professional

- **My experience of math in high school was a waste of my time! The only reason I did good [in College Algebra] at MSU was because I took math courses at OCC for audit.**

Math tutoring in high school? Yes. 1994-97.
Summer School Algebra, 1996 and math at OCC, 1996, to get me ready for College Algebra at MSU.
Math placement exam? Yes. Do not remember the score, though I ended up guessing on a lot of the questions.
Math tutoring in college? Yes. Math. (College Algebra), to improve my understanding of the course.
15a) 2 (only helped me by teaching me how to use the TI-82 Calculator)

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Andover 213 2.75-3.25 ACT 18-20 MSU Undecided

- **I did not enjoy Math at Andover High School. I feel it did not prepare me for College Math.**

Math placement exam? Yes. 3%/100%
15a) N/A

Andover 220 225-2.75 ACT 18-20 Michigan-Public Education

- **I did not have much success in the Core Plus Math Program in High School. Since it wasn't regular algebra or calculus, it was difficult.**

Math placement exam? Yes. Beginner course. I will take [exam] over again (didn't take the class).

Andover 224 3.25-3.75 SAT M 600-700 V 600-700 UMAA Liberal Arts

- **Core Plus may be a good idea for non-college bound students - but almost 100% of Andover's [graduating] classes go to college. I feel like I was screwed over.**

Summer School. Algebra 1, summer before freshman year.
Math placement exam? Yes.. Received < the 10th %tile; placed in 105 (pre-calc).
Math tutoring in college? **Yes. Math - I had no idea what was going on.**
15a) 1

Andover 228 3.25-3.75 ACT 21-23 Michigan-Public Fine & Performing Arts

- **My class (1997) was the first class to use Core-Plus, so the kinks were still being worked out. However, I do not feel I can hold a conversation about math problems, using math vocabulary, due to the lack thereof using Core-Plus.**

Math placement exam? Yes. Placed in entering freshman math (basic).
15a) 3

Andover 229 3.25-3.75; SAT M 500-600 V 700-800; ACT 27-29; Michigan-Public; Communications

- **My Math teachers seemed to make math a chore, rather than a subject to be learned and studied. I always ask "why" and "how", and in math, those questions were never answered. It was always "Just do it!" That is a large part of why I do not take an interest in math.**

Summer School? Yes
15a) 1

Remaining Andover Group I Students (non-accelerated (Core Plus))

Andover 5 3.25-3.75 ACT 24-26 UMAA Social Science

- **Calculus at Michigan is not hard, but the TA's that teach it make it hard. Exams are extremely difficult.**

Math placement exam? Yes. Placed in Calc. 115.
Math tutoring in college? *Yes. Instructor was a Teaching Assistant [and] was incapable of teaching material well.*
15a) 5

Andover 102. 3.25-3.75; ACT 21-23 MSU Pre-Professional
Math tutoring in high school? Yes. 1993-95
Math placement exam? Not yet (I want to start from the lowest.)

Andover 109 3.25-3.75; SAT M 500-600 V 700-800 UMAA Liberal Arts

Andover 182 2.75-3.25 MSU Social Science
Math placement exam? Yes.
15a) 1

Andover Group II Students (accelerated) who made comments about Core Plus[2]

Andover 37 2.75-3.25 ACT 27-29 UMAA Liberal Arts

- **The new math program has made math difficult for many college students.**

15a) 3 b) 3

Andover 41. 3.25-3.75; SAT M 600-700 V 500-600; ACT 30-34; UMAA Pre-Professional

- **I was [one of few] to ever take both Core Plus and "regular" math at Andover High School. Thus making me a "guinea pig" in this heated debate. I have a lot of good views on this so feel free to contact me. PS I saw the article in the News and I believe I can add to what was said.**

Math tutoring in high school? Yes. Geometry 1993-94. Pre-Calc 1995-96
Math placement exam? Yes. Placed into Calc. I. I think I was the only Andover student who took a Core-Plus class to place into Calc I (Math 115).
15a) 5 b) N/A
Content of subsequent e-mail message. *My views about Core Plus are not necessarily negative but I think more constructive if anything. There are some things about the program that are better than "traditional" and some that aren't and vice versa.*

First, and I have thought this since the beginning, I don't think that the high schools are in the authoritative position to initiate a major change in the way that math is taught. The biggest argument when Core Plus (CP) first came aboard was that it wouldn't complement what colleges were teaching. That proved right, and the educators who were firmly behind CP neglected to hear out and respect the students' and their parents' worries. An alternative route would have been to work in conjunction with universities and maybe have the universities change first and then the high schools would follow. I remember that I was told in the beginning that CP is the new wave of mathematics and that it is the way everything will be in the future...including colleges. Well, guess what, I'm in college and there isn't a CP program here, although some people claim that "Harvard Calculus" (Math 115-116 here) is a good fit with CP. I will have to check this out further, but that still leaves the schools that don't feature reform calculus, and there are many of those, including many top schools.

I found that CP was interesting, much more interesting than "Hey, let's do 1-99 odd and look in the back of the book for the answers". It explained the "How"s, "What"s, and "Why"s of the math problems. Though what it forgot to do is emphasize the mechanics of the problems. The important steps were never really emphasized. It seemed almost like they were steering away from directly solving the problem. Why beat around the bush? I found myself a lot of times using my past knowledge from traditional classes to solve CP problems. Maybe that's where I go wrong but hey, a math program isn't supposed to make the student make adjustments to it, it should be flexible enough for anyone to respond to it. Working in groups was often a bonus. Though a lot more teamwork and feedback is produced during group work, it is also easy to have some members trail off into no man's land, and thus hindering the group's performance, and their own.

From the start of my CP class, I found the material quite insufficient. No practice problems, examples, and insufficient explanations were all what I found as a problem with the thin color coded packets. Sometimes you would have to rely on the explanation of your group but then would have to question if the explanation was correct or not. Thus, slowing down the learning process.

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[2] See also Lahser 202.

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In conclusion, I want to be clear that I am not trying to insult the program. I do think that it could be a useful method in Mathematics if presented correctly. I have a lot of respect for my high school and for what they strive to do. I believe that Andover is amongst the elite secondary schools in the nation, and for that I am proud of it. The faculty of Andover has always striven for the best, though it seems as if they are selling themselves short with CP.

Andover 50 2.75-3.25 SAT M 600-700 V 500-600 UMAA Pre-Professional

- **The traditional math courses in high school helped me tremendously in my college calculus course. I cannot understand how someone without these basic skills can take a college level calculus course. In high school I had many friends in the Core-Plus program and by senior year they could not even factor or do other basic mathematics which I learned in 8th grade! And there were above 3.5 GPA students. Personally, from experience and observation of my peers, I don't think there is a way to get around learning basic math skills. For example, when teaching a child to tell time one does not need to impart the interworkings of a clock. The explanations of the "Why"s come much later, after the fundamentals are in place.**

It seems to me that this whole Core-Plus movement is geared toward the "laziest" common denominator. It discriminates against those who want to excel in math and take the time to learn/memorize the basics. Where is the common sense in all of this? It is non-existent. Where else would you teach advanced concepts without the fundamentals? In life you have to start out with a base and then move on to greater and more complicated things.

Do you teach a child thermodynamics when teaching them not to touch a hot stove? No. You just teach them that the stove is hot, don't touch. 2+2 is 4 and 8x7 is 56. There's no way to talk around it. One just needs to memorize it. If one doesn't have this base, how can one move on to greater things like calculus. In college-level courses one can explain why certain answers are arrived at, but at lower-level courses, explaining why 4+5 equals 9 is completely unnecessary!

Some people don't seem to realize how this new approach has sealed the fate on many students. They are so far behind that I doubt they will ever be able to make up for what has been lost. I found the U of M placement test to be very basic. Any student with the fundamentals of algebra and geometry should be able to either pass the test or at least get most of the problems correct. However with many of my "Core-Plus friends," this was not the case. Some, even 3.9 students, received a near 10% score, if that, on their placement test.

It seems quite obvious that many of the Bloomfield Hills Core-Plus students are ill-prepared for higher level learning. Shame on the Bloomfield Hills School District.

Math placement exam? Yes. I was placed in Calculus 115.
15a) 5 b) 3

Andover 59 3.75-4.00 SAT M 700-800 V 700-800 UMAA Liberal Arts

- **I think the Core-Plus program stinks! It babysteps around the true concepts of math and instead kids learn a 'watered-down" version which they can't really use. I feel very fortunate that I did not have to take Core-Plus classes. If you would like to reach me for additional comments you may do so through e-mail [...]. Thanks.**

Andover 62. 3.25-3.75 SAT M 600-700 V 600-700; Non-Michigan-Public; Business

- **99% of my circle of friends were part of the new math program implemented by Andover. My knowledge is that they are having an extremely difficult time with college math courses and their SAT math scores were very low. I feel that Andover should return to the standard math curriculum and teaching of it.**

Math tutoring in high school? Yes. Calculus. 1996-97.
15a) 5 b) 1

Andover 113 3.25-3.75 SAT M 700-800 V 700-800; ACT 30-34 UMAA Engineering

- **I found that taking High School Calculus helped a great deal when I took Calculus II. I also found that I performed much better on standardized math exams than my peers who took Core Plus.**

Math placement exam? Yes. Score = 80%. Placed into Calculus II.
15a) 3 b) 5

Andover 116 2.75-3.25; SAT M 600-700 V 700-800; ACT 30-34 Other Fine & Performing Arts:

- **I enjoy math and enjoyed the classes I took, but because I am going to an Art School, I am not required to take Math courses. In eight grade, because ours was the first class to start the Math Core program in high school, we were given a choice. If we got into the advanced class, Algebra 1, we would continue on in the original, classic Math program. I had no interest in entering into a new experimental program, and so [I] worked extra hard to get into the Advanced Algebra 1 class. Luckily, I made it.**

15a) 1 b) 1

Andover 151 3.75-4.25; SAT M 700-800 V 600-700 ACT 30-34 UMAA Engineering

- **I attended Andover during the transition from the traditional math program (which I took) to Core-Plus. As a student at the UM College of Engineering, I firmly believe that Core-Plus does <u>not</u> adequately prepare students planning to enter any field that requires math (math, science, engineering, etc.). Students [in Core Plus] depend too heavily on calculators, due to the fact that they have no knowledge of the fundamental aspects of algebra. True, "Core-Plus" may tie math in with "real-world" situations, but problems in fields that require math are seldom "real-world" situations.**

Math placement exam? Yes. Placed into Calculus.[Took higher level course due to AP test score.]
15a) 5 b) 5

Andover 165 3.75-4.00; SAT M 600-700 V 700-800; ACT 30-34; UMAA; Science/ Pre-Med

- **I feel like I was one of the lucky ones who escaped the horror of Core Plus. I'm not a math person and luckily I was able to do well enough in high school to avoid as much [math] as possible in college; but if I was a math-oriented student and I had had a Core-Plus background, I'd be in BIG TROUBLE.**

Math placement exam? Scored in 80th percentile. Placed into Calc 115. (AP credit placed me out of Calc 115/116, though)
15a) 5 b) 5 (I haven't taken a math class yet, but I assume it would have helped.)

Andover 185 3.75-4.00; SAT M 700-800 V 700-800 ACT 30-34 UMAA Undecided

- **I really believe that having specialized math classes (i.e. geometry, calculus, algebra, etc.), rather than Core Plus classes, truly helped me in preparation for standardized tests.**

15b) N/A

Andover 222 3.75-4.00 ACT 24-26 UMAA Business

- **My experiences have led me to believe that my high school math program prepared me for college and SAT/ACT much better than [the] Core Plus Program.**

Math placement exam? Placed in Math 115/116 [Calc I/II]
15a) 5 b) 5

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Remaining Andover Group II Students

Andover 1 3.75-4.00; SAT M 600-700 V 700-800 ACT 30-34 UMAA Science
Math placement exam? Yes. [Passed]

Andover 2 3.25-3.75 SAT M 700-800 V 700-800 ACT 30-34 UMAA Engineering
- **Very good program [at Andover]. Calc. teacher taught at and involved with U of M, so he taught appropriate subjects and style for intended U of M students.**

Math placement exam? Yes. Calc 116.
15a) 5 b) 5

Andover 15 3.75-4.00 SAT M 600-700 V 600-700 UMAA Liberal Arts
- **For the above two questions (#15) I was considering physics a "math course" since I have not taken any others in college.**

Math placement exam? Yes. Placed into Math 115, which is Calc I.
15a) 4 b) 4

Andover 26 3.75-4.00 SAT M 600-700 V 700-800 UMAA Pre-Professional
Math placement exam? Yes. Placed into Calc I (115)
15a) 4 b) 2

Andover 28 3.75-4.00 SAT M 600-700 V 600-700 ACT 27-29 UMAA Science
- **I [was] definitely not impressed with the quality of grad. student instructors (GSI's) at the U of M. There was a communication barrier and I believe that the courses [Calc I&II] lacked a lot.**

Math tutoring in high school? Yes. Calculus BC. 1997
Math placement exam? Yes. I placed into Calculus 116. I opted to take Calc. 115 instead so I would be more prepared.
15a) 3 b) 4

Andover 29 3.25-3.75 SAT M 600-700 V 600-700 UMAA Engineering
- **My 2nd Semester Calculus course [Calc II] was identical; to my AP Calculus course [AB Calc.] in high school.**

Math placement exam? Yes. [No score given. Took Calc. II and Calc III]
15a) 3 b) 5

Andover 35 3.25-3.75 ACT 27-29 UMAA Social Science
- **Because of taking calculus (traditional) in high school and because of my teacher (Dr. Shelly), I was able to slide through Calc 115 - I barely studied while others failed - you were expected to teach yourself**

Math placement exam? Yes. Placed into Calc. 115. Don't know scores.
15a) 5 b) 5

Andover 44 3.75-4.00 ACT 30-34 UMAA Business
- **Dr. Michael Shelly was an excellent Calculus teacher (Andover High School). U of M need[s] more GSI's that speak English.**

Math placement exam? Yes. Score - ?; Math 115.
15a) 3 b) 5

Andover 46 3.25-3.75; SAT M 600-700 V 600-700 ACT 27-29; UMAA Engineering

- **The division of subdivisions within math helped my focus. Furthermore, it helped me identify each subdivision in more complex math courses.**

Math placement exam? Yes. Top 5%.
Math tutoring in college? Yes. Math 116, problems with integrals.
15a) 5 b) 5

Andover 48 3.25-3.75 ACT 27-29 UMAA Science
Math tutoring in high school? Yes. Algebra. 1995
Math placement exam? Yes. Placed into Calc. 115, but because of AP's, I went into 116.
15a) 5 b) 5

Andover 58 3.25-3.75; SAT M 600-700 V 600-700 UMAA Business

- **I was able to get by in High School courses with severely limited knowledge and still pull a "B".**

Math tutoring in high school? Pre-Calc. Junior year.
Math placement exam? Yes. Placed in low level course. [Took Stat. 100].
15a) 2 b) 1

Andover 61 3.75-4.00 ACT 30-34 UMAA Pre-Professional
Math placement exam? Yes. I placed into Math 115 or Calc. I.. [Took Calc. II.]
15a) 3 b) 5

Andover 85 3.75-4.00; SAT M 700-800 V 600-700; ACT 30-34; Private; Science
Math placement exam? Yes. Calc.I/II Placement Test: Calc. II
15a) 3 b) 5

Andover 88 2.75-3.25 SAT M 700-800 V 700-800 Other

Andover 96 3.25-3.75 SAT M 600-700 V 600-700 ACT 27-29 UMAA Science

- **The U of M Math department is terrible.**

Math placement exam? Yes. Placed into Calc. 115. The highest possible placement without AP credit.
15a) 3 b) 3

Andover 103 3.75-4.00; SAT M 600-700 V 700-800 ACT 30-34 UMAA Liberal Arts

- **Calculus BC was the most exciting and interesting course in high school. Although I think I would do well, I don't plan on taking any math courses in college.**

Math placement exam? Yes. I placed out of Calc. I and II.
15a) N/A b) N/A

Andover 104. 3.75-4.00 ACT 30-34 Private Business

- **My high school math teachers were wonderful. I learned more from them than I did from my college professor. Dr. Shelly was able to successfully explain concepts of calculus and make it interesting at the same time.**

15a) 5 b) 5

Andover 117 3.75-4.00; SAT M 700-800 V 600-700; ACT 30-34 Private Social Science

- **I placed out of the calculus courses that a majority of my college peers took freshman year.**

Math placement exam? AP tests served as placement.
15a) N/A b) N/A

Andover 119 2.75-3.25 ACT 24-26 Private-regional Engineering
Math placement exam? Yes. Scores were not revealed but I was suggested to take Pre-Calc.
15a) 3 b) 3

Andover 127 3.75-4.00 SAT M 700-800 V 500-600 ACT 27-29 UMAA Science

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Math placement exam? Yes. Calculus placement.
15a) 4 b) 5

Andover 138 3.75-4.00 SAT M 600-700 V 600-700 ACT 27-29 UMAA Business

- **My math experience in high school was satisfactory; I was very fortunate to have had good teachers. As for college, I enjoyed Math 115 [Calc. I] because the teacher was very thorough, but I disliked Math 116 [Calc. II] because the teacher was very disorganized and didn't seem to enjoy teaching. Teachers (rather than the curriculum) play such a crucial role in my math education. I would like to add, though, that I had no complaints about the traditional math program.**

Math placement exam? Yes. Score 88%. Placed into Calc. I.
15a) 4 b) 5

Andover 140 3.25-3.75 SAT M+V 1100-1200 ACT 27-29 Other Fine & Performing Arts

- **We had 3 levels of Math achievement. I was placed in the accelerated class and could never keep up!**

Math tutoring in high school? Yes.
Summer School?. Algebra.
Math tutoring in college? I will attend U of M in the Fall and will need a math tutor.
15a) 3.5 b) 3.5

Andover 156 3.75-4.00 SAT M 600-700 V 700-800 UMAA Social Science

- **[A complimentary remark, by comparison with other teachers, about Miss Cathy King.]**

Math placement exam? Yes. I was placed in 115.
Math tutoring in college? Yes. Calc. To prove that I was at least making an effort at trying to perform better on the exams.
15a) 2.5 b) 1

Andover 158 3.75-4.0 SAT M 700-800 V 600-700 ACT 30-34 UMAA Science

- **I had 3 excellent years of traditional high school math and one fair year of [...]. I was very well equipped to handle college math, which was perhaps easier than that taken during high school.**

Math placement exam? Yes. [Doesn't give score. Placed in Multivariable Calculus because of AP score.]
15a) 5 b) 5

Andover 161 3.25-3.75 SAT M 700-800 V 700-800 ACT 30-34 Private Science

- **College math classes (including calculus) and high school math, I believe, are entire[ly] different endeavors. Although high school math should be the basis and is necessary for further education in higher math, it does not necessarily help in college math (taking into account only the curriculum).**

15a) 1 b) 4

Andover 166 3.25-3.75; SAT M 600-700 V 500-600; ACT 24-26; Private; Social Science

- **Math has always been one of my favorite subjects and I've enjoyed it throughout high school and college.**

15a) 5 b) 5

Andover 176 3.25-3.75 SAT M 600-700 V 500-600 UMAA Science

- I was lucky enough in high school to have pretty good math courses with good teachers. These math classes prepared me for college math classes because I had a stable math background coming into college.

Math placement exam? Yes. Placed into Math 115.
15a) 4 b) 4

Andover 179 3.75-4.00 SAT M 70-800 V 700-800 Private unsure
15a) 4 b) 5

Andover 181 3.25-3.75 SAT M 700-800 V 500-600 ACT 27-29 Private-regional Social Science

- **I found the math courses prior to Calculus AB fairly easy.**

15a) 3 b) 4

Andover 183 3.25-3.75 SAT M 700-800 V 500-600 ACT 24-26 UMAA Business

- **I was forced to memorize math concepts in High School and it wasn't valuable to my learning. College math [Calc. I] has taught me to learn and apply ideas. More beneficial.**

Math tutoring in high school? Yes. Geometry. 1994.
Math placement exam? Yes. I placed into Calc. 115
15a) 4 b) 4

Andover 198 3.25-3.75; SAT M 600-700 V 500-600 ACT 27-29 Non-Michigan-Public Science

Andover 219 3.75-4.00; SAT M 700-800 V 500-600; ACT 27-29; UMAA; Pre-Professional or Education
Math placement exam? Yes. 94th %tile
15b) N/A

Andover 221 3.25-3.75 SAT M 600-700 V 600-700 ACT 27-29 UMAA Liberal Arts

Andover 232 3.25-3.75; SAT M 700-800 V 700-800; ACT 30-34; UMAA Social Science

- **Calculus class [was] very good at Andover. Michigan math program is embarrassing. It is the worst thing I have ever been a part of. The math base [in Calc II] was ignored and short cuts were taught. The program is horrendous.**

Math placement exam? Yes. Basic Algebra. 90th percentile?
Math tutoring in college? Yes. Calc. 116. From GSI to get better grade.
15a) 4 b) 5

Lahser Group I Students (non-accelerated)

Lahser 10 325-3.75; SAT M 600-700 V 600-700; ACT 27-29; Private-regional; Science/Engineering.
Math Placement Exam? Placed in Calc. I
15a) 4

Lahser 11 3.25-3.75 ACT 21-23 MSU Liberal Arts

- **I dislike math. I feel as if I will never use any of it in life later on. When will I ever use Descartes' Rule?**

Math tutoring in college? Yes. Math 1825 and 103, very bad in math.
15a) 3

.Lahser 34 2.75-3.25 ACT 21-23 Other Nursing.

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Please note: I have included all responses. Even those which had no comments. The first line contains GPA, SAT, ACT, college, and college major information. If comments were given in response to item 16, then they start on the second line, preceded by a "bullet" and written in boldface. Successive items are labeled. Other comments may be highlighted in italics or boldface.

Math Placement Exam? Yes. Normal level for my grade.
15a) 4

Lahser 38. 3.25-3.75; SAT M 500-600 V 600-700; ACT 24-26; Non-Michigan-Public; Communications

- **I lacked basic knowledge of Calculus or Trig. [Respondent took neither in H.S.]**

15a) 4

Lahser 46. 3.25-3.75; SAT M 600-700 V 600-700; ACT 24-26 UMAA Social Science/Business

- **The Math. Dept. at U of M doesn't know how to teach. It is all applied non-memorized tests. [Respondent took Calc 1.] The stuff in high school is so easy and basic - you do problems that are all the same. In college it is taking a deeper understanding of that simple problem and using it in combination with others for something complex.**

Math Placement Exam? Yes. I was placed in pre-calc. (105).
Math tutoring in college? Yes. Math Lab - for homework question help.
15a) 2

Lahser 54 3.25-3.75; SAT M 500-600 V 500-600 ACT 24-26 UMAA Pre-Professional

- **I thought my high school prepared me well for all of my non-math classes at U. of M.; however, the math classes at U of M are supposed to be very hard, and I have heard people did not feel prepared for the math classes at U. of M.**

Math Placement Exam? Yes. Placed into Math 105, which is equivalent to pre-calc.
15a) 3

Lahser 64 2.25-2.75; SAT M 500-600 V 400-500; ACT 21-23; Michigan-Public; Business

- **I feel that I had a good math experience in high school, but I think the math placement test given by [my University] was poor and did not place me correctly into the math class I should have been in.** [Respondent evidently felt placement was too high, judging by grade received.]

Math Placement Exam? Yes. I was placed into finite math.
15a) 4

Lahser 68. 2.75-3.25; SAT M 600-700 V 600-700; ACT 21-23; Michigan-Public; Undecided
Math tutoring in high school? Yes. Alg. II 1995-96.
Math Placement Exam? Yes. College Algebra.
15a) 3

Lahser 96 3.25-3.75 SAT M 600-700 V 500-600 ACT 24-26 UMAA Social Science

- **High school math course needs to teach students how to solve and get right answer. Not just getting the answer. [Respondent took Calc I].**

Math Placement Exam? Yes. Placed in Math 115 [Calc. I]. Passed exam with 95%.
15a) 4

Lahser 117 3.25-3.75 ACT 21-23 Michigan-Public Nursing

- **Although I placed into only Intermediate Algebra in College, I found the class to be very easy and not challenging at all. I am sure I would have done fine in regular College Algebra, but instead I have to take it this year.**

Math placement exam? Yes. Placed into Intermediate Algebra.
15a) 5

Lahser 136 2.75-3.25 Michigan-Public Education

- **I hate, hate, hate math! I think that some Math courses are pointless and will never be used.**

Math tutoring in high school? Yes. Algebra. 1993-94.
15a) N/A

Lahser 141 3.4 ACT 21-23 UMAA Design

- **It was really hard for me to understand some things in Math, but when you get a great teacher that will take the time to help me, I can finally understand.**

Math tutoring in high school? Yes. Algebra 2. Sophomore year.

Lahser 148 3.25-3.75 ACT 27-29 MSU Business
15a) 3

Lahser 154 3.25-3.75 SAT M 500-600 V 600-700 ACT 24-26 MSU Fine & Performing Arts
Math Placement Exam? Yes. I was placed into Math 103 [College Algebra], the lowest credit math course.
15a) 3

Lahser 170 3.25-3.75 ACT 24-26 UMAA Education

- **I just had a hard time in Pre-Calc. but had a very easy time in Algebra II. I think it was the teaching style.**

Math Placement Exam? Placed into 105 or 115.
Math tutoring in college? Yes. I went in for math help from my teacher during Math Lab and office hours.
15a) 4

Lahser 175 3.75-4.00 SAT M 600-600 V 500-600 ACT 24-26 Private Science
Math tutoring in college? *Yes. Calc 140 - At [my college] there are 3 levels of calculus. I had the requirements for the middle level, however, due to the extreme demands of the upper lever (whose requirements were one year of calculus) the majority of those students dropped down a level into my section. My professor then stopped teaching to the level of the students (like myself who the class was intended for) and taught only to the students that had already learned the material. Therefore the original students (approx. 20) worked with the math intern assigned to our class. (Of the 20 of us, 13 changed our class grade to pass/fail because we had no idea what was going on [Respondent passed]) I have now just finished a summer class at OCC and have learned what I was supposed to have [learned] last year.*
15a) 1

Lahser 195 2.25-2.75 ACT 18-20 Michigan-Public Engineering
Math tutoring in high school? Yes. Algebra 1. Freshman year.
Math tutoring in college? Yes. Math 110, tutoring to get help pass class.
15a) 4

Lahser 198 2.75-3.25 SAT M 500-600 V 500-600 Private Business/ Design

- **Minimal math - didn't prepare me well - need to catch up in college. [Respondent took only Algebra 1 and Geometry in H.S.]**

15a) 2

Lahser 206 [not given] ACT 24-26 Other Fine and Performing Arts.

- **I am an art major - no math in college.**

Lahser 212 3.25-3.75 Non-Michigan-Public Fine & Performing Arts

- ***It was fun.***

Math Placement Exam? Yes. Basic Math.
15a) 4

Please note I have included all responses. Even those which had no comments. The first line contains GPA, SAT, ACT, college, and college major information. If comments were given in response to item 16, then they start on the second line, preceded by a "bullet" and written in boldface. Successive items are labeled. Other comments may be highlighted in italics or boldface.

Lahser 219 3.25-3.75; SAT M 500-600 V 700-800 ; ACT 27-29; MSU Communications/Business

- **I think there is still a sex bias in which men are driven into the areas of math and science here and encouraged to more than girls.**

Math tutoring in high school? Algebra I 1992 (8th grade). Pre-Calc. 1997.
Math Placement Exam? Yes. I received an 11/20 - Placed in Math 110 [College Algebra and Finite Math.]
15a) 4

Lahser 222 2.75-3.25 ACT 18-20 Private-regional Education
15a) 3

Lahser 230 2.25-2.75 SAT M 500-600 V 500-600 Michigan-Public Nursing

- **It was overall pretty good; I know that I'm bad at math, so my grades reflected the fact that I didn't try too hard. I need to put in extra time for those classes.**

Math tutoring in high school? Yes. Spring, 1997, Pre-Calc. Fall, 1997, College Algebra
Math placement exam? Yes. I was placed in Intermediate Math
Math tutoring in college? Yes. College Algebra, because I was doing poorly in the class and I wanted to improve my grade.
15a) 5

Lahser 233 3.25-3.75 SAT M +V 1100-1200 ACT 24-26 UMAA Science
Math placement exam? Yes.. Math 105 (Pre-Calc). [Took Stat 100.]
15a) 3

Lahser 241 3.75-4.00 ACT 24-26 Michigan-Public Science and Liberal Arts
15a) 5

Lahser 250 2.25-2.75; SAT M 300-400 V 600-700; ACT 18-20; Non-Michigan-Public; Liberal Arts

- **I am a horrible math student (I have had trouble all throughout schooling.), but in high school I was in advanced English.**

Math tutoring in high school? Algebra I, 1994. Geometry, 1997.
Math Placement Exam? Yes. It was 30 questions. I failed.
15a) 1

Lahser Group II Students (accelerated, no calculus)

Lahser 14 2.25-2.75 Other

Lahser 17 3.25-3.75 ACT 24-26 MSU Business

- **I believe that by taking AP Statistics senior year I scored poorly on the math placement test in college, because I had not used general algebra for quite some time, but once I took algebra in college [Math 103: College Algebra], it was very easy.**

Math placement exam? Raw Score: 10. Eligible to enroll in Math 103, 110, 116 or 120.
15a) 5

Please note: I have included all responses. Even those which had no comments. The first line contains GPA, SAT, ACT, college, and college major information. If comments were given in response to item 16, then they start on the second line, preceded by a "bullet" and written in boldface. Successive items are labeled. Other comments may be highlighted in italics or boldface.

Lahser 20. 2.75-3.25; SAT M 600-700 V 700-800 Non-Michigan-Public; Communications
- **High school math departments need to encourage, not discourage, girls to succeed and continue their mathematic[al] careers.**

15a) 4

Lahser 60 3.75-4.00 SAT M 600-700 V 600-700 ACT 30-34 UMAA Business
Math placement exam? Yes. I scored in the 60th percentile and was placed in Calculus.
15a) 4

Lahser 62 3.75-4.00 SAT M 600-700 V 500-600 ACT 24-26 UMAA Science
- **The tests in college (at least at U of M) are MUCH harder than high school tests [Respondent took Calc I&II], which test only the concepts in a way already studied. College tests test the application of the concepts through story problems, ones different from any already in the text.**

Math tutoring in high school? Yes. Algebra II, 1994-95. Pre-Calculus, 1995-96.
Math placement exam? Yes. Placed into Calculus I.
15a) 4

Lahser 74 3.75.-4.00 SAT M+V 1100-1200; ACT 27-29; Michigan-Public Business
- **Math was definitely not my favorite class in high school. However, I have really enjoyed the math courses I took in college. I like math a lot more now.**

Math placement exam? Yes. I don't remember my score, but it was not high enough to place into Calculus.
Math tutoring in college? Yes. Attended Supplemental Instruction right after class, for group study and review.
15a) 4

Lahser 87 2.75-3.25 SAT M 600-700 V 400-500 ACT 21-23 MSU Engineering
15a) 3

Lahser 92 3.75-4.00 SAT M 600-700 V 700-80 ACT 30-34 UMAA Liberal Arts
Math Placement Exam? Yes. Placed into Pre-Calculus.

Lahser 101 2.75-3.25 SAT M 500-600 V 500-600 ACT 24-26 MSU Science
- **College TA's have been more detrimental to my learning than helpful. Most of my work has been on my own. High School math was completely unhelpful.**

Math Placement Exam? Yes. [Score not given. Took Intro. College Algebra and College Algebra.]
15a) 2

Lahser 108 2.75-3.25; SAT M 600-700 V 60-700; Private-regional Social Science/Business
- **High school math teachers (at Lahser) were far better than those at [my college].**

15a) 5

Lahser 127 3.25-3.75 SAT M 500-600 V 500-600 UMAA Science/Liberal Arts
- **In high school I learned in math more from the teachers than in college. However, I overall learned more in college because of tutoring. I think that the math program at U of M needs improvement. I along with many others did not learn anything without help from others.**

Math tutoring in high school? Yes. Pre-Calc. Junior Year.
Math placement exam? Yes. Pre-Calc.
Math tutoring in college? *Yes. Pre-Calc., because they don't know how to teach math at all.*
15a) 2

Please note. I have included all responses. Even those which had no comments. The first line contains GPA, SAT, ACT, college, and college major information. If comments were given in response to item 16, then they start on the second line, preceded by a "bullet" and written in boldface. Successive items are labeled. Other comments may be highlighted in italics or boldface.

Lahser 142 3.25-3.75 SAT M 600-700 V 700-800 ACT 30-34 Other; Liberal Arts
- **I didn't do well in pre-calc. Because, well, I didn't really like it. So I didn't do my homework. (Isn't that terrible?) That's why my grades went down.**

Lahser 178 2.75-3.25 ACT 24-26 Non-Michigan-Public Liberal Arts
15a) 3

Lahser 186 2.75-3.25 ACT 21-23 Michigan-Public Science/Education
- **Math classes taught do not always apply back to life; because of that it is hard to learn what can't be applied.**

15a) 3

Lahser 243 2.0-2.25 Michigan-Public Engineering
- **Teachers who are enthusiastic about their subject get a better response.**

15a) 4

Lahser Group III Students (accelerated, with calculus)

Lahser 2 3.75-4.00; SAT M 700-800 V 700-800; ACT 30-34; Private; Science
- **Calc. BC gives excellent preparation for Multivariable Calc., other applications. I think it is very reasonable to cover Algebra II/Trig/Pre-Calc. in three semesters instead of the traditional four, leaving room to introduce Multivariable Calc. in Senior Year, if desired.**

Math placement exam? Yes. Credit received for Probability and Statistics. Score around 130/200.
15a) 5 b) 5

Lahser 18 3.75-4.00 SAT M 700-800 V 500-600 ACT 27-29 UMAA Science
Math placement exam? Yes. Placed in the 97% percentile or out of Calc. 116 [Calc. II].
15a) N/A b) N/A

Lahser 30 3.75-4.00 ACT 30-34 MSU Engineering
- **I think there are gap[s] between High School and College Math level[s].**

15a) 1 b) 3

Lahser 32 3.25-3.75 SAT M 600-700 V 600-700 ACT 27-29 UMAA Science/Pre-Professional
Math placement exam? Yes. Score of 99th percentile.
15a) 5 b) 4

Lahser 71 3.25-3.75 SAT M 600-700 V 500-600 ACT 24-26 UMAA Science
- **Math in high school was very easy and did not go very in depth. In college we covered a broad variety of topics and went into greater detail. Teaching in college math courses are [read "is"] very poor.**

Math placement exam? I scored in the top 20% of students and was placed into Calc. II because of the high score and AP test score.
15a) 3 b) 5

Lahser 77. 3.75-4.00 SAT M 700-800 V 600-700 Private; Science/Liberal Arts
- **Math is based on <u>rules</u> whereas some other subjects (e.g. English) are based on connotations; therefore, math needs to be taught (at least in the beginning) in a format stressing <u>rules</u> rather than interconnections, which may be interesting, but are confusing to the beginner.**

Math placement exam? Yes. More a test of ability than for placement.

15a) 5 b) 5

Lahser 83 3.25-3.75 SAT M 600-700 V 600-700 MSU Engineering
Math tutoring in college? Yes. Help from my T.A.
15a) 4 b) 5

Lahser 95 3.75-4.00 SAT M 600-700 V 700-800 Private Science
15a) N/A b) 5 (I received 2 semester's credit for Calculus.)
Lahser 106 3.75-4.00 SAT M 700-800 V 600-700 ACT 30-34 UMAA Engineering
15a) 2 b) 4

Lahser 118 2.75-3.25; SAT M 600-700 V [not given]; ACT 21-23; Michigan-Public; Business
Math placement exam? Yes. Placed into Algebra 2.
15a) 3 b) 1

Lahser 120 2.25-2.75 SAT M 600-700 V 500-600 ACT 27-29 MSU Business

- **Math was much harder in High School than college.**

Math placement exam? Yes. I placed into the highest math, Calc. 132.
15a) 5 b) 5

Lahser 139 2.75-3.25 SAT M 700-800 V 500-600 ACT 27-29 UMAA Business
Math placement exam? Yes. Placed into Calc. 116.
15a) 3 b) 5

Lahser 153 3.25-3.75 ACT 24-26 MSU Business
15a) 2 b) 4

Lahser 161 3.25-3.75 SAT M+V 1200-1300 ACT 21-23 UMAA Undeclared
15a) 4 b) 4

Lahser 162 3.75-4.00; SAT M 600-700 V 700-800; ACT 30-34; Non-Michigan-Public; Education
Math placement exam? Yes. Placed into Statistics.
15a) 2 b) 1

Lahser 165 3.25-3.75; SAT M 700-800 V 700-800 Non-Michigan-Public; Science and Fine & Performing Arts

- **I feel that I learned almost all of my high school math during Freshman and Sophomore years. [I did not mesh with my advanced math teacher's] teaching style, which was more concerned with "Did you get the right answer?" than "Do you know the method to get the right answer?".**

15a) 5 b) 2

Lahser 172 3.75-4.00; SAT M 700-800 V 700-800; ACT 30-34; UMAA; Science, Liberal Arts, Engineering

- **I wish we had learned Abstract Algebra in High School, because it is the basis for many substantial theoretical math courses in college (for math majors).**

15a) 2 b) 3

Lahser 174 3.25-3.75 ACT 30-34 Non-Michigan-Public Pre-Professional/Business
15a) 4 b) 4

Lahser 181 3.25-3.75; SAT M + V 1200-1300; ACT 27-29; UMAA; Social Science/Science

Lahser 182 325-3.75; SAT M 600-700 V 600-700 ACT 27-29; Non-Michigan-Public Science
15a) 4 b) 5

Lahser 185 3.75-4.00 ACT 27-29 Michigan-Public Science

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Math placement exam? Yes. Placed in Calc. I
15a) 5 b) 5

Lahser 191 3.75-4.00 ACT 27-29 UMAA Science
I hate numbers and formulas. I only like people. T. Koehler was my teacher Senior year. Per his absence most of the year, I was not able to expand and strengthen my already feeble math skills Math placement exam? Yes. If you can't tell, I hate math and have a very bad memory. I don't keep track of scores either. I almost passed into Calc, but not quite per placement exam. [Took Calc. I]
15a) 1 b) 1

Lahser 201 3.75-4.00 SAT M 700-800 V 700-800 UMAA Social Science
- ***Math 115 [Calc. I] at U of M SUCKS. My graduate student instructor hardly spoke English and never properly prepared us for exams.***

Math tutoring in high school? Yes. Geometry Honors, 1993-94. Calculus AB, 1996-97.
Math placement exam? Yes. Placed into 185 Calculus but only took 115 Calculus
15a) 3 b) 3

Lahser 202 3.25-3.75 SAT M 600-700 V 600-700 ACT 27-29 MSU Engineering
- **My school district has changed [its] math program (doesn't offer Algebra 1 in BHMS) [the middle school that feeds both high schools], and I'm very displeased since I don't think kids will be as well prepared for math classes at college. I know of kids that came from Andover High School who had a change in their math program, and those kids are having a hard time at college math. I also know of kids who came from other areas that required taking 2 math classes for 1 year (usually geometry and algebra), or that took Algebra 1 sooner than the rest, and I think that's a great idea. Personally, I think teachers should concentrate more on math than they do, and try to help everyone to excel at it, (although this is hard to do). Maybe having more math teachers available from grade school on?**

15a) 3 b) 5

Lahser 207. 3.75-4.00; SAT M 700-800 V 700-800; ACT 30-34, Private, Engineering
- **High School math did not prepare me for the rigor of college math. [...]**

15a) 3 b) 4

Lahser 209 3.75-4.00; SAT M 700-800 V 700-800 ACT 30-34 UMAA Social Science
- **Pre-Calculus and Calculus were a good foundation. The entrance exam as well as the AP exam were approachable because of the good math foundation I had Junior and Senior year, largely due to the teacher's capabilities.**

Math placement exam? Yes. Placed out of Calc 1 & 2.
15a) 4 b) 4 (I didn't take a specific math course, but I did take courses for which I had to recall and apply high school math.)

Lahser 220 3.25-3.75; SAT M 700-800 V 500-600 ACT 27-29 UMAA Engineering
- **I had some great teachers. Mr. Dobosinski and Mr. Koehler. They helped me a great deal, although to be truthful, math has always [been] quite easy for me.**

Math placement exam? I got 97, give or take 3%.
15a) 3 b) 5

Lahser 236 3.75-4.00 SAT M 600-700 V 700-800 ACT 30-34 UMAA Liberal Arts
Math placement exam? Yes. Calc. II.

15a) N/A b) 2

Lahser 242 3.25-3.75 SAT M 600-700 V 500-600 ACT 24-26 MSU Business
15a) 3 b) 3

Lahser 245 3.75-4.00 SAT M 700-800 V 700-800 ACT 30-34; Private Science

- **My AP Calc. BC and AP Statistics courses were very well taught and have really prepared me!**

Math placement exam? No. The AP's were our placement tests.
15a) 4 b) 4

Lahser 252. 2.75-3.25; SAT M 600-700 V 500-600; ACT 21-23; Non-Michigan-Public; Business

- **I've always been good at math. I like math. To me it just makes sense, and that is exactly why Finance will be my major.**

Math placement exam? Yes. I placed right below Calculus.
15a) 5 b) 3 (so far)

Lahser 254 3.25-3.75 SAT M 500-600 V 700-800 ACT 30-34 UMAA Undecided

- **Calculus at UM really was not a good experience. [Took Calc. I] Syllabus and method need revamping.**

Math placement exam? Yes. Placed into Calc. 115.
15a) 5 b) 5

Lahser 255 3.25-3.75 SAT M 700-800 V 600-700 ACT 30-34 Private Science

Appendix N- Letter from JoAnn Schiller

Letter from JoAnn Schiller
Creative Publications
Chicago, Illinois

February 14, 2000

Re: February 2, 2000 Hearing on "The Federal Role in K-12 Mathematics Reform," Committee on Education and the Workforce Subcommittee on Early Childhood, Youth & Families and Subcommittee on Postsecondary Education, Training & Lifelong Learning

Written Testimony by Professors Diane Resek and Dan Fendel, Department of Mathematics, San Francisco State University, and Sherry Fraser and Lynne Alper, Mathematics Educators, Interactive Mathematics Program

The following testimony is respectfully submitted by the authors of the Interactive Mathematics Program (IMP) to be entered into the record. In part, we wish to make the joint committee aware of false and highly misleading statements in the February 2, 2000 testimony of Professor R. James Milgram.

Items I, II, and III of our testimony provide background about the Interactive Mathematics Program and about the achievements of students enrolled in the program. Item IV directly addresses the false and misleading testimony of Professor Milgram.

I. In 1999, the Interactive Mathematics Program (IMP) was selected as one of five Exemplary Mathematics curricula by the U.S. Department of Education Expert Panel. The curriculum was evaluated according to criteria designated by the panel, which included categories examining the program's quality, usefulness to others, educational significance, and evidence of effectiveness and success.

The two members of the Expert Panel charged specifically with evaluating impact on student learning wrote:
* "There are consistent achievement test score differences that tend to favor IMP students in well-designed studies using matched control groups."
* "There is extensive evidence, both quantitative and qualitative taken from multiple studies . . . that students had significant gains in their understanding of mathematics."

The Interactive Mathematics Program (IMP) is designed to offer four years of college preparatory mathematics to high school students. The four-year core curriculum of problem-based mathematics replaces the traditional Algebra I-Geometry-Algebra II/Trigonometry-Precalculus sequence. These topics are part of a revised sequence that integrates traditional areas of mathematics with new topics such as probability, statistics, and matrix algebra.

After a thorough study of the IMP curriculum, the University of California approved the first three years of the program as satisfying the mathematics component of the a-f admissions requirements to the U.C. system and approved the fourth year of the IMP curriculum as a "mathematics elective." This means, in effect, that the University

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considers students who have completed three years of the IMP program to have learned the mathematics in a traditional Algebra I-Geometry-Algebra II/Trigonometry sequence and considers the fourth year equivalent for admissions purposes to a senior course in precalculus. (Note: The IMP sequence also includes considerable mathematics that is not part of the traditional mathematics sequence.)

II. IMP's grant from the National Science Foundation included the funding of a careful and professional evaluation of the program, conducted by the Wisconsin Center for Education Research (WCER) at the University of Wisconsin-Madison. The following summary addresses important aspects of student achievement as determined in that evaluation.

a. Transcript Analysis

Three high schools had students who graduated in June 1993 with three years of IMP. (At that time, the fourth year of the IMP curriculum had not yet been developed.) An analysis was completed of those students' high school transcripts and the transcripts of all other students who graduated that year from the same schools. The transcripts showed that the IMP students took more mathematics and received better grades in high school than students using a traditional curriculum of Algebra I-Geometry-Algebra II/Trigonometry.

At one school, test scores from middle school were available for most students so a comparison could be done using pre-measures. The groups were matched according to their CTBS (Comprehensive Test of Basic Skills) scores in mathematics in the 7th grade. The non-IMP group had virtually identical pre-scores to the IMP group and also matched them in terms of gender and ethnic make-up.

The IMP students performed as well as the non-IMP students on the mathematics component of the Scholastic Assessment Exam (SAT), and had a higher overall grade-point average and mathematics grade-point average. The differences in grade-point averages between the two groups were statistically significant. The transcript analysis also looked specifically at the records of students from the IMP and non-IMP groups who were in the upper 25th percentile on the 7th grade CTBS test (using national norms). The two groups had virtually identical 7th grade scores. It was found that IMP students in that group had significantly higher grade point averages in high school, even after mathematics grades were discounted. The IMP students also had a higher average on the SAT test than the non-IMP group, although the difference was not statistically significant.

The observation that IMP students do as well as non-IMP students on standardized tests is especially meaningful because IMP students devote 20-30% of their mathematics program to learning important topics that are not covered in traditional curricula and are not covered on standardized tests.

b. Achievement in Statistics, Problem Solving, and Quantitative Reasoning

In 1995-1996, WCER conducted a set of three studies to evaluate performance by IMP students in the areas of statistics, problem solving, and quantitative

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reasoning. The tests were conducted in grades 9, 10 and 11, respectively, at three different schools in different parts of the United States. In all three studies, IMP students demonstrated substantial knowledge and proficiency in these topics, doing significantly better than students who were enrolled in a traditional mathematics course sequence. In a follow-up study in 1996-1997, in the areas of statistics and problem solving, IMP students again performed significantly better than students using a traditional mathematics sequence. (The quantitative reasoning study was not repeated because the instrument used was no longer available.)

III. Several individual schools or districts have conducted studies to assess performance by IMP students on standardized tests, as compared with students in traditional course sequences. The following are two examples:

a. At Eaglecrest High School in Aurora, CO, IMP students who elected to take the SAT for college entrance began the 1991-92 school year with an average SAT raw score of 6.74, compared to an average of 6.91 for students in the traditional sequence. At the end of the school year, the average score for IMP students who took the SAT was 9.66, compared to an average of 8.16 for students in the traditional sequence. Thus, the IMP average increased by 2.96 points, while the traditional average increased by only 1.25 points. This difference is statistically significant at the .025 level.

b. At two high schools in Philadelphia, PA, matched groups of students were compared in terms of their performance on the Stanford-9 achievement test, which was administered to all students by the school district. At both schools, the IMP students outperformed the traditional students on a substantial majority of subscores and on all the cumulative scores.

To our knowledge, every professionally conducted study that has used reliable measures of collecting student data has confirmed that IMP students are doing at least as well as, and sometimes better than, students in traditional mathematics programs on standardized tests of mathematics achievement.

IV. In his February 2, 2000 testimony before the joint committees, Professor R. James Milgram made false and highly misleading statements about the IMP curriculum.

a. Professor Milgram stated "Recent studies of the SAT mathematics scores of high schools which use IMP showed a consistent and significant decline over the last ten years."

First, ten years ago, only three schools were using the IMP curriculum, and the students who were in the program were too young to consider taking the SAT. In fact, there were no IMP students taking the SAT test until at least 1992, and then in only those three schools in California. In a rather alarming discrepancy, Professor Milgram's paper "A Preliminary Analysis of SAT-I Mathematics Data for IMP Schools in California" shows a figure of 4629 IMP students taking the SAT test in 1969, and similar figures for other early years of the program's implementation, when in fact the number of such students was zero or very small.

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Second, Professor Milgram's paper, which purports to analyze data for IMP schools, makes no recognition of the fact that nearly all schools using IMP also have students enrolled in a traditional mathematics courses

Third, the data in Professor Milgram's paper actually indicates an increase in SAT scores at what he calls "IMP schools," yet he claims that there has been a decline.

b. Professor Milgram stated "Since 1989, the percentage of entering students in the California State University System . . . that were required to take remedial courses have [sic] increased from 23% in 1989 to 55% today." His testimony suggests that this increase is due to programs such as IMP. (In his paper "A Preliminary Analysis of SAT-I Mathematics Data for IMP Schools in California," he explicitly describes this increase as "an indication of the effect of programs like IMP.")

In fact, there were no IMP graduates entering the California State University (CSU) system until 1993, when the first small group of students using IMP completed high school. This class of 1993 consisted of fewer than 200 students, of whom only a very small portion entered the CSU system, which involves hundreds of thousands of students. Even by Fall, 1998, only 40 schools in California had graduates who had completed the IMP program, out of 851 high schools statewide, and most of the students in these 40 schools had not participated in the IMP program. To even suggest that a program involving such a small group of students could be responsible for the data he cited is ludicrous and irresponsible.

The spurious claim that the IMP program, involving such a small group of students, could be held responsible for a remediation problem in the California State University system is an indication of the unreliable nature of the information presented in Professor Milgram's testimony before the committee

c. Professor Milgram attributed an increase in mathematics exam scores for 1998-99 in Sacramento Unified School District to "major changes" made in the district. In fact, the district's new program was initiated in 1999-2000. To attribute an increase in 1998-99 scores to a change implemented in 1999-2000 is again ludicrous and irresponsible.

d. Professor Milgram states that "at the present time there is no valid research which shows that any of the programs of this type are effective." In fact, he is fully aware of the studies done by WCER showing the achievements of students using the IMP program. In an email message to Dan Fendel in November 1999, he wrote "I believe all the statistics he [Norman Webb, director of the WCER study] has quoted, and could find no errors in the statistical analysis of the data he has."

Professor Milgram's bias against the foundation of curricula based on the NCTM standards is well known in the mathematics community. His unprofessional claims and attempts to discredit IMP and other programs that represent a new direction in education are shameful and disappointing, and will further obstruct efforts of educators who want to create positive, viable alternatives for students in our schools.

Thank you for this opportunity to set the record straight.

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ONLINE ARTICLE

Kappan Home
PDK Home

The Politics of California School Mathematics: The Anti-Reform of 1997-99

By Jerry P. Becker and Bill Jacob

The authors tell the story of a powerful group of parents and mathematicians in California who manipulated information and played off of the public's perception of our "failing schools" to acquire political clout. Through this telling, they hope that other states will be able to adopt a more rational course as they reconsider their policies.

Illustration © 2000 by Jem Sullivan

THE FEBRUARY 1999 issue of the *Kappan* featured a special section devoted to the recent controversies in mathematics education. Together, these articles offer an excellent background to the key issues surrounding those controversies. The discussions make clear why the traditional drill-and-practice curriculum has failed to help most students, and they explain what researchers have identified as necessary factors to improve student understanding. The authors examine why proposed changes are slow to be implemented, and they note that much of the criticism of the reforms is based on superficial understanding. Furthermore, they explain why citing poor test scores in criticizing reforms is not reasonable. The special section also included an article describing the new curricula funded by the National Science Foundation, an article documenting the success of one of those curricula, and two articles offering contrasting views of California's new math standards.

Collectively, these articles provide compelling reasons why educators must move forward with mathematics education reform. Nevertheless, the state board of education in California has mandated extreme steps in the opposite direction. Taking the February 1999 *Kappan* as background, we wish to outline here some of what has occurred in the nation's most populous state. It is a story of a powerful group of parents and mathematicians who manipulated information and played off of the public's perception of our "failing schools" to acquire political clout. We will tell this story using the public writings of those who have prevailed in the debate. We will also substantiate many of the claims made in some of the articles in the February *Kappan* and so bring specificity to the discussion and allow readers to see what the policy documents in California actually say. Through this examination, we hope other states will be able to adopt a more rational course as they reconsider their policies.1

Background

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Like other states, California has a state board of education. Its members are appointed by the governor, subject to the approval of the state legislature. There is also a state superintendent of public instruction, who is elected by popular vote and heads the California Department of Education, whose function is to provide administrative support for the state board and the state's education programs. In California, however, all decisions involving school curriculum standards, frameworks, and adoptions of instructional materials fall under the purview of the state board, not the state superintendent.

During 1997, the Standards Commission -- whose members are appointed directly by the governor, the state superintendent, and the legislature -- drafted California's first K-12 language arts and mathematics standards. State law requires that what the commission develops be approved by the state board. As Michael Battista noted in his February 1999 *Kappan* article, the commission approved "middle-ground" mathematics standards in September 1997, but, at the request of two state board members, these standards were substantially revised by four Stanford University mathematics professors prior to their December approval. Although California's public meeting act requires that any committee of more than two appointed by a state board member must give public notice of its work sessions, the revisions were drafted in secret and were approved without input from K-12 educators or the public.

In addition to mathematics standards, California has a separate mathematics framework. A separate framework committee was appointed by the state board and met publicly to draft a new mathematics framework. At the direction of its chair, this philosophically divided committee avoided discussions of pedagogy and devoted much of its effort to listing topics on a grade-by-grade basis. The committee quickly learned that restricting discussion to content does not forestall controversy. And because the state board required that the standards describe the content, most of the framework committee's work had to be tossed out during the 1998 framework revision.

Although the framework committee had primary responsibility for revising the framework, the revision was carried out by several groups of advisors appointed by the state board, all working without the required public notification. The most substantial policy changes were introduced during the final writing stages and included no serious input from K-12 teachers or mathematics education professionals. Although introductory chapters proclaim a balance of basic skills, conceptual understanding, and problem solving as the aims of the framework, the heart of the document is devoted to reinforcing the instruction and rote skills approaches of the past.

During 1999, several major legislative initiatives were tied to the framework and the standards. A $1 billion textbook adoption was completed over the summer,[2] and approved texts were supposed to include the content of the standards. In the fall, the state board chose three "approved providers" who will instruct teachers in the "research-based approaches" of the framework as part of a $43 million professional development allocation to schools. Finally, the new statewide testing program, called STAR (Standardized Testing and Reporting), included augmentations to the 1999 version of the Stanford 9 exam to reflect the more specialized content in California's standards.

The Mass Media's Myth of Failed Reform

The rapid changes in California's mathematics policy followed a persuasive (albeit deceptive) campaign alleging the failure of the current reform movement in mathematics education. Those arguing for a return to the past ignore the compelling evidence that the drill-and-practice classrooms have shortchanged students for decades, and they fail to note that, for the most part, today's students with unacceptable test scores have not experienced the reformed mathematics curricula. In California, the claim that the 1992 framework had failed its elementary students was widespread by early 1995, in spite of the fact that

curricula aligned with the framework would not be available to teachers until fall of that same year.3 Indeed, very little "reform" mathematics was actually taking place.4 These concerns about the "failed reform" led the state legislature to enact a new law (AB 170) in 1995, requiring the state board to adopt instructional materials that are "based on the fundamental skills, . . . including basic computation skills."

How is this possible? While the media have tried to make sense of the debate that surrounded the controversial developments, it seems that they would not or could not get to the heart of each side's position. Typical news reports stated that the controversy was over "the best way to teach math" and that the arguments over teaching were about such issues as "use of real-world problems versus an emphasis on skills" or "integrated versus traditional curriculum." While on the surface such media reports are not incorrect, as Battista notes, they miss the central issues.5 Moreover, articles on low test scores also described "recent" reform materials in a way that left those who failed to read carefully with the impression that the new materials were the root cause of the problem rather than a proposed solution.

We believe that what Battista calls the "myth of coverage" accurately summarizes California's framework discussions: "If mathematics is 'covered,' students will learn it." The 1997 framework committee decided not to "prescribe pedagogy" in its document6 and spent most of its time listing procedural skills for mastery at each grade. But even with pedagogy off the table, the committee members could not agree on content, nor could they even agree on a format to discuss how to balance skills with problem solving, as requested by the state board. In their written "committee homework" (which is available in public documents) on "how to balance K-6 mathematics," two northern California mathematics professors offered contrasting views: "The curriculum should include extended projects or capstone problems that require the student to synthesize and integrate concepts and calculational techniques" and "I suggest that our goals and expectations of elementary school children should be pretty much limited to arithmetic."7 The latter view prevailed. How mathematical questions could be posed in the framework was particularly problematic. For example, the committee majority rejected an area problem on a geoboard for two reasons: It "prescribed manipulative pedagogy," and "the appropriate tools for geometry are the straightedge and compass." The heart of the debate was whether to write about sense-making curricula or instead to apply the myth of coverage and describe procedures in detail. The California press never understood this.

To observe that the two versions of the standards were the foci of unabated interest across the land and for many months is an understatement. For example, the National Council of Teachers of Mathematics (NCTM) devoted the front page of the February 1998 issue of its *News Bulletin* to unflattering comments about the state board's revised standards. Hung-Hsi Wu reported that "the reaction to the revision was swift and violent."8

The press reports on the standards debate usually reduced the question to high standards versus low standards. Delaine Eastin, the state superintendent, was widely quoted as saying that the state board had "dumbed down" the standards. Here again, while publicizing each side's favorite one-liners, the press failed to ferret out the basic differences. Central issues included the state board's consistent removal of such terms as "estimate" or "explain," which it replaced with "calculate"; the removal of the study of patterns from the "algebra and functions" strand in elementary school; and the complete removal of all exemplars that were designed to help K-12 educators (and textbook authors) understand how topics can be approached at a given grade level. The press never seemed to examine why both sides would claim that their views represented "high standards." Does moving rote mastery of computational skills to a lower grade level raise standards? Does adding an expectation that students explain what a numerical procedure means in geometric terms raise standards?

Selected Mathematicians' Views

A unique feature of California's new school mathematics policy is the influential role of university mathematicians. Four Stanford University mathematics professors substantially revised the standards in 1997, and three mathematics professors wrote the sample problems for the framework in 1998. Two math professors wrote key sections of the framework's discussions for teachers and then, on 22 September 1999, led the department of education presentation for publishers, explaining what was expected of them when they submit materials for adoption in August 2000. Two other mathematics' professors judged (and extensively rewrote) the curriculum for the professional development providers, for which $43 million will be available during 2000-01. To our knowledge, none of these mathematicians ever taught in K-12 schools, and, throughout their work on policy, there was never a publicly scheduled session for them to interact with K-12 teachers. Mathematics professors also ran the Math Content Review Panels for the billion-dollar materials adoption that was completed by the state board during summer 1999. Through these actions, the state board made it clear whose voice would count and whose would be ignored. In order to understand California, it is important to consider the privileged views of the math professors.

Mathematics professor Hung-Hsi Wu of the University of California, Berkeley -- also a key mathematician in the framework rewrite -- wrote a paper describing his assessment of the standards revision. He regards the original standards as a thoughtful document that showed that a lot of care was put into the setting of goals.9 But overall, Wu focused in his paper on the importance of "getting the mathematics right." He felt that there were many errors that needed correction and topics that were omitted, and he believed that there was an ambiguous mixture of pedagogical statements with content statements. For example, Wu strongly objected to a grade 4 geometry standard that read: "Students understand and use the relationship between the concepts of perimeter and area and relate these to their respective formulas." He argues that the trouble is "that there is no relationship whatever between perimeter and area, or between volume and surface area, unless it be the isoperimetric inequality. However, the latter would be quite inappropriate for students at this level." About such perceived errors, Wu uses strong language: "I very much regret to say that this kind of mathematics standards would guarantee the deterioration of mathematics education for a very long time."10

While this standard may constitute an error in the eyes of a research mathematician, a fourth-grade teacher explained to us how she interprets it: "We want students to understand at their level that perimeter 'goes around' and area 'covers,' and then to be able to explain, for example, in the case of a rectangle why

$$2 \times l + 2 \times w$$

can be understood as measuring the 'going around' while

$$l \times w$$

counts covering (say by square tiles)." We think a teacher could learn more about this topic from the clarifications and examples in the original standards (eliminated by the state board). So we find a serious breakdown of communication between those members of the mathematics community who value precise abstract constructions and those members of the K-12 education community who have learned to interpret the informal presentations of ideas that children use as they develop mathematical thinking.

The beliefs of mathematicians about problem solving and conceptual understanding are illustrated through their discussions of inappropriate curricula. In the framework, a mathematician author wrote the following about a kindergarten problem:

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> The students are given a picture that shows in succession a rectangle, triangle, square, rectangle, triangle, square, blank, triangle, square. The students are asked to fill in the blank.
>
> While this problem may seem to be a reasonable one (and an example of problems that all too commonly appear in the mathematics curricula of the lower grades), it cannot be considered a problem in mathematics. From a mathematical point of view, there is no correct answer to this problem unless more data are supplied to the students. Mathematics is about drawing logical conclusions from explicitly stated hypotheses.11

We must remember that this is a discussion about teaching mathematics in kindergarten! The belief that mathematics must include showing why all hypotheses are true begins at this early age. Moreover, the author is concerned that, if students do not use formal mathematical language and reasoning to support answers, their learning may be in jeopardy. The passage continues with the following statement repeated as a sidebar to emphasize its importance:

> But if students were to start thinking that every mathematical situation always contains a hidden agenda for them to guess correctly before they can proceed, then both the teaching and learning of mathematics would be tremendously compromised.

Particularly striking is the choice of words "hidden agenda." It illustrates the distrust that pervades the debate. We wonder why the framework failed to be mathematically correct in terminology and did not say "missing hypotheses." The discussion also highlights this professor's view of the importance of mathematical precision throughout instruction. Use of a problem that might require students themselves to think and decide upon implicit or additional assumptions is rejected as inappropriate for developing mathematical reasoning. Instead, by grade 7, students are expected to know how to provide a 16-step, two-column proof of such algebra facts as

"A number satisfies x-1/4 · (3x-1) = 2x-5 when and only when x=3."12

In the public presentation, the two mathematics professors had an opportunity to explain the overarching themes behind their revision of California policy. One discussed why extensive practice with the standard long division algorithm is so important. He explained that students learning differential equations at Stanford University lacked adequate proficiency with long division of polynomials, which they needed for their Laplace transform problems. Apparently this difficulty is the fault of their elementary teachers, who, when these Stanford students were in their classrooms, would have used the same parrot math California has now resuscitated. Later, the importance of proof in grade 7 as preparation for algebra was emphasized. For example, the other professor rigorously proved that

$$(-2/5) \times (7/4) = -[(2/5) \times (7/4)].$$

The identical proof was repeated a second and third time in response to questions from the audience. After his second time through, some members of the audience were not convinced, and the professor remarked, "I'm puzzled as to why this is difficult. I'm not trying to make fun of you." In this way publishers learned why formal reasoning across the grades is so essential to marketing their products in California.

The mathematicians also recorded their beliefs in their work on the Content Review Panels for the 1999

adoption. Most mathematics programs eventually approved by the state board were required to align their content with the standards, and all the programs selected emphasize drill and practice of skills as a basis for instruction. One program -- Connecting Math Concepts (not part of the Connected Mathematics series) -- had been firmly rejected by the Review Panels in April because it failed to meet the standards. But the state board approved it anyway, which stirred some controversy because Douglas Carnine, one of the program's primary authors, has had a long-standing collaborative relationship with several board members.13

Another program (Everyday Mathematics) entered into extensive negotiations with the state department after it learned that its Content Review Panel had failed to reach consensus. Eventually, it was rejected after a mathematics professor prepared a second content review two weeks before the state board's vote. His criticisms are revealing, including, for example, that "students are never required to use the standard long division algorithm" as required by California's grade 5 standards. Inspection of the program reveals that students do indeed study a minor variant of the standard division algorithm that illustrates that repeated subtraction enables one to calculate a long division. And even though many students understand this process far better than the conventional approach, it is now unacceptable for California's students. Parrot math has scored a significant victory.

Finally, the content expertise of mathematics professors has given them authority to design professional development for elementary teachers. One program approved by the state board was completely rewritten by its math professor reviewer, and, in grades 4 and 5, the natural numbers are explained using the five axioms of Peano:

1. There is a first counting number, i.e., one or uno.
2. Every counting number has a successor.
3. No two counting numbers have the same successor.
4. One is not the successor of any counting number.
5. The successors of one exhaust the counting numbers.

Teachers then learn, "From these five assumptions alone, it is possible to deduce many of the important properties of number." With such a rigorous foundation, the state board believes that its fourth- and fifth-graders can go on to be more proficient with the 1950s-style addition, subtraction, multiplication, and division. To make sure, the teachers attending the sessions will be given pretest and posttest drills on these same computations, along with diagrams showing exactly how to line their numbers up in the neat columns that are required for calculation.

Curriculum and Assessment

Many of the concerns that some mathematicians have stem from the introduction of curricula that have problem solving as a basis for instruction.14 Distrust of such curricula has provoked a great deal of the controversy in California. In a supplemental adoption (September 1997), the state board rejected two programs highly recommended by the Curriculum Commission, citing mathematical errors and other problems as its reasons.15 Examples of mathematical errors noted by the board included writing "ratios instead of fractions" and a number theory mistake that "30 divides the product 36 x 45," which the state board explains in its written report is an error because "30 is not a factor of either 36 or 45." Other than noting a few typographical errors, the state board's written objections to the mathematical content are fallacious and appear to be based on a view that mathematics cannot be learned in any way other than a rigid sequence of activities. The state board's public discussion leading to the rejection of Connected Mathematics centered on a problem that included a "pizza pirate," which was cited as explicitly violating the state's patriotism and morality code (Ed. Code 60200.5).16

We feel it is important to note that the American Association for the Advancement of Science recently issued a report (see http://project2061.aaas.org/matheval/index.htm) in which the Connected Mathematics series of books is cited as an exemplary middle school program. Yet, by contrast, the group known as Mathematically Correct, two of whose founders were appointed to the 1997 framework committee in California, gave the program an F (see http://www.mathematicallycorrect.com/books7a.htm). If you believe in sense-making curricula, you will rate the Connected Mathematics series highly; if you believe that learning mathematics consists mainly of learning procedures by rote, you will give it an F.

In early October 1999, the U.S. Department of Education (ED) endorsed 10 K-12 mathematics programs, describing them as "exemplary" or "promising." This announcement greatly distressed supporters of the new California framework because they had vigorously opposed three of the exemplary programs during the California debate.17 But this group is not short on political (or financial) clout. According to *Education Week*, they received $67,000 from David Packard's Los Altos-based Packard Humanities Institute to take out a full-page ad in the *Washington Post* protesting ED's endorsement and including a letter signed by university academics. Packard's institute actively supports school districts in California that implement SRA's Open Court reading program, and Packard made California headlines in October 1998 by contributing $500,000 to Gloria Tuchman's campaign for state superintendent of public instruction. Tuchman based her losing campaign on opposition to bilingual education and support of back-to-basics education. Throughout this clamor, the mathematics professors continually proclaimed that their content expertise provided them with a better understanding of how to teach mathematics than those who actually teach K-12 students.

California developed its own statewide testing program during the early 1990s (the California Learning Assessment System/CLAS), and this performance-based assessment was field-tested in 1993 and administered statewide in 1994. But some of the free-response questions on CLAS were considered controversial, 18 and Gov. Pete Wilson vetoed funding for the program, resulting in a three-year gap in the state's testing program. California's new STAR assessment is tied to the standards. What will this bring? In his discussion on testing, Battista notes that "most school districts rely heavily on standardized tests and state 'proficiency' tests as bottom-line measures of their students' progress in learning." This has become state policy in California. For example, in the framework's assessment chapter we find:

> But certain methods, like timed tests, play a more basic role in mathematics assessment than they do in other areas of the curriculum in measuring conceptual understanding and skills and in checking whether students have an adequate knowledge base -- whether they understand the material to the depth required for future success.19

So Battista's concern that "most school programs teach students how to solve by rote the specific types of problems that appear on these tests"20 has become an official guideline in California. Reference to free-response test items that require teachers to focus on students' mathematical thinking has disappeared.

But California was not to be satisfied with an off-the-shelf multiple-choice test. Although the state board selected the Stanford 9 exam, special problems were added in 1999 to ensure alignment with the standards. A necessarily confidential committee created these problems, and, in order to get an idea of what they might look like, we consider here some of the sample problems added to the 1999 framework by mathematicians. At the third-grade level, a mathematics professor provided the following:

> When temperature is measured in both Celsius (C) and Fahrenheit (F), it is known that they

are related by the following formula: 9 x C = (F - 32) x 5.

What is 50 degrees Fahrenheit in Celsius? (Note explicit use of parentheses.)21

This is certainly a challenging algebra problem for *third*-graders. (The grade level is not a typographical error.) But we wonder how students who are just beginning to develop the concept of multiplication are supposed to understand its symbolism in any meaningful way. Perhaps parrot math has a way to get there, but the California framework, in which university mathematicians played a key role and which is now the state's official math policy document, gives no clue.

California's new emphasis on procedural algebraic skills prompted Gov. Gray Davis to endorse using the algebra standards as the basis for the state's new High School Exit Exam (HSEE). Earlier, state board member Janet Nicholas had promoted this approach, stating that it was supported by mathematicians. In contrast, the HSEE committee advocated using a combination of standards in number, algebra, geometry, probability, and statistics -- reflecting needs of average citizens. The committee had also heard from civil rights attorneys who stated that, because of California's lack of certified mathematics teachers in poor neighborhoods, reliance on specialized skills (such as those included in the algebra 1 standards) would most definitely lead to lawsuits. Mathematics educators oppose the exclusive use of algebra in the exam largely because it will encourage teachers to teach symbolic manipulation mindlessly by rote when the priority should be helping students make sense of the mathematics they need in daily life.

At its December meeting, the state board learned that not a single publisher had responded to the request to develop the exam. Reasons cited included short time frame, uncertainty of topics, and the fear of lawsuits. It was viewed as "an impossible task," the *Los Angeles Times* reported, adding a comment by Robert Schaeffer of FairTest: "It shows that politicians have gone so overboard in their testing craziness that even the test manufacturers can't keep up with them."22

Research

California law requires that state-adopted instructional materials "incorporate principles of instruction reflective of current and confirmed research" (CA Education Code 60200c-3). But even in such an apparently noncontroversial area, California has opened new categories of dispute. For example, the state board invited E. D. Hirsch, Jr., to speak on this issue in April 1997. In the written version of his comments, Hirsch ridiculed "mainstream educational research," as found in "journals such as the *Educational Researcher*," explicitly stating, "This is a situation that is reminiscent of what happened to biology in the Soviet Union under the domination of Lysenkoism, which is a theory that bears similarities to constructivism."23

After some explanation, Hirsch continues, "I shall briefly outline the conflicts between educational Lysenkoism and mainstream science in testing, math, and early education." Citing math education experts John Anderson, David Geary, and Robert Siegler on the matter of what research shows that math students need, he goes on, "They would tell you that only through intelligently directed and repeated practice, leading to fast, automatic recall of math facts, and facility in computation and algebraic manipulation can one do well at real-world problem solving."24 Hirsch received a standing ovation from the state board, and then the board moved forward in line with his recommendations.25

In spite of the state board's instructions to base the framework on research, the framework committee never discussed any research articles. Instead, in July 1997 state board member Janet Nicholas announced a contract award to Douglas Carnine, a professor at the University of Oregon, to provide a review of high-quality mathematics research on which the framework's instructional strategies would be

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based. In the resulting document, known as the Dixon report, which Carnine presented to the board in March, we find, "From a total of 8,727 published studies of mathematics in elementary and secondary schools, only 110 passed the multi-level evaluation criteria we developed to identify high-quality studies."26 All the studies are experimental, most consider interventions over very short intervals, many deal with learning-disabled students, and some use "instructional booklets" in order to eliminate teacher/pupil or pupil/pupil interaction (which were considered "confounding variables").

The American Educational Research Association's Special Interest Group for Research in Mathematics Education has written a public letter to the state board (signed by 73 researchers) protesting the poor design of the Dixon report. But despite numerous errors (e.g., incorrect reporting of grade levels, content, or experimental design), the state board included in the framework the main recommendations of the report in the chapter on instructional strategies.

In describing opponents of math reform, Battista wrote: "Because they don't agree with the findings of specialists, they seek out researchers in other areas to buttress their case. For instance, there are educational and cognitive psychologists who occasionally conduct research on the learning of mathematics. Unfortunately, they usually apply general, essentially behaviorist theories that ignore both the methods and the results of modern mathematics education research."27 We see this as the California story in a nutshell. We note in passing that Carnine played a key role in California's Reading Program Advisory, a detail that reinforces the parallels O'Brien draws between the California reading and math experiences.28 Indeed, the development of the frameworks in both these areas involved many of the same players!29

Concluding Remarks

In 1987, the state department published the *Mathematics Model Curriculum Guide*, which included 88 pages devoted to "teaching for understanding" with classroom examples.30 This document clarified many themes from the 1985 framework and proved to be quite influential, both for teachers interested in change and for textbook developers. Also at that time, "replacement units" were made available to teachers so that they could try out some of the new approaches to teaching math. But policy that includes "teaching for understanding" as its centerpiece has vanished from the California mathematics education landscape, and mastery of procedural skills is now the order of the day in the state's standards, framework, standardized assessments, and professional development.

California's return to the past is an accomplishment that makes those opposed to reform especially proud. Wayne Bishop, a mathematics professor and a vocal and strong supporter of the new California policies, put it this way in his February 1999 *Kappan* article: "There is nothing in the precollegiate mathematics curriculum 30, 40, or even 50 years ago that is not relevant today or that competent schools do not still require. Conversely, there is almost nothing in a good precollegiate course of study today that would have improved a good program of 50 years ago."31 When Bill Jacob denounced the 1997 framework draft at the committee's final meeting, saying it was a return to the curriculum of the 1960s, he was corrected by another math professor on the committee who told him that the framework represented the curriculum of the 1950s and that he was proud of it! With $500 million already appropriated for the new materials, we think all citizens should be concerned that California's students will begin the 21st century preparing for the job market just as their grandparents did.

In spite of California's politics, we believe that there is a compelling need to move mathematics education reform forward. For example, as U.S. mathematics educators continue to deal with the "backlash" to reform, other important issues must still be addressed, among them how precise mathematical language and logical arguments (from informal reasoning to formal proof) are developed,

how "real-world" problems can help enhance mathematical understanding, and how simultaneously to avoid a possible overemphasis on real-world applications where the distractions of the context can sometimes obscure the mathematics.

Beyond the curricular issues, there still remain issues of teacher preparation. There is insufficient support for the professional development of teachers, and there is an urgent need to revamp preservice teacher preparation programs.32 Using the new curricula requires greater teacher understanding of both the mathematics and the various approaches students take to learning. In addition, there are those who feel a need to examine further under what circumstances cooperative learning is effective and, more generally, how constructivist thinking is influencing, or should influence, approaches to teaching.33

We note, too, that U.S. Secretary of Education Richard Riley has expressed serious concern about the deep divisiveness that evolved during the California debate. In a talk delivered at the January 1998 meeting of the American Mathematical Society in Baltimore, he stated forcefully "the need to bring an end to the shortsighted, politicized, and harmful bickering over the teaching and learning of mathematics. I will tell you that if we continue down this road of infighting, we will only negate the gains we have already made, and the real losers will be the students of America."34 Referring to the California "math wars," he continued, "Let me say right now that this is a very disturbing trend, and it is very wrong for anyone addressing education to be attacking another in ways that are neither constructive nor productive. It is perfectly appropriate to disagree on teaching methodologies and curriculum content. But what we need is a civil and constructive discourse." However, Riley now finds himself under political attack by some of the very mathematicians who attended his talk. So we wonder whether the California "math wars" have served a useful purpose. Perhaps they have provided a lesson on how *not* to carry out the reorganization of mathematics curricula for our schools and students.

Finally, in April 2000 the National Council of Teachers of Mathematics will release the final version of its Standards 2000 document, outlining a balanced view of teaching for understanding that pays adequate attention to both skills and problem solving. The same mathematicians who helped create the new policies in California and who attacked the U.S. Department of Education's list of exemplary and promising programs may well launch an attack on NCTM. Perhaps we will hear again about lack of mathematical precision, lack of skills (with emphasis on "standard algorithms"), mathematical errors, inappropriate calculator use, low standards, and the "research" that supports the critics' views. But we need to be vigilant and careful and not be fooled by their seemingly impressive credentials and writing. We need to look carefully at the details. While there is always room for improvement in any endeavor, instead of joining forces with teachers and contributing to the process, these critics may once again interfere with efforts to reach more students in order to secure their vision of 13 years of precalculus symbol manipulation. Content knowledge is no substitute for knowledge of how students' understanding develops, but this point seems lost on these critics. We ask readers to examine the NCTM document. We are convinced they will see the same merit in it as we do.

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1. In Massachusetts, several key players from California's back-to-basics movement have been collaborating with Deputy Commissioner Sandra Stotsky on last-minute revisions of that state's mathematics framework. The approaches bear similarities to what happened in California. In particular, the voice of research mathematicians is valued more highly than that of teachers. In an e-mail message directed to mathematics professor James Milgram of Stanford University (whose response is dated 27 October 1999), Stotsky requested advice on the draft of the Massachusetts framework as follows: "Jim, I (and the DoE) will appreciate anything you have to say in any form you wish to say it. The comment form is there to guide people in the field, particularly teachers. But you are free to offer comments in your own way because the remarks from academics will be considered separately from those from

teachers and administrators in the schools." We wonder if, as in California, the Massachusetts framework will be rewritten by a select few university mathematicians outside the public process and with little input from teachers.

2. The special adoption (AB 2519) will provide $250 million per year for the four years 1998-2002 in mathematics, language arts, science, and social studies. This exceeds -- and is in addition to -- California's yearly textbook appropriation.

3. California law required 30 months between setting criteria and adoption. The instructional materials approved in October 1994 by the state board were aligned with the 1992 framework criteria, and state funding for the purchase of these materials was available for the 1995-96 academic year.

4. For further discussion, see Thomas C. O'Brien, "Parrot Math," *Phi Delta Kappan*, February 1999, especially pp. 435-36.

5. Michael T. Battista, "The Mathematical Miseducation of America's Youth: Ignoring Research and Scientific Study in Education," *Phi Delta Kappan*, February 1999, especially pp. 431-33.

6. This committee approved its draft by a vote of 13-9 in August 1997. The second author voted in opposition. The document approved by the state board in December 1998 was completely different.

7. Curriculum Frameworks and Instructional Resources Office, "Mathematics Framework Committee Homework," California Department of Education, Sacramento, 1997 (public documents available at each meeting).

8. Hung-Hsi Wu, "Some Observations on the 1997 Battle of the Two Standards in the California Math War," mimeographed, University of California, Berkeley, 1998, p. 1.

9. Ibid., p. 2.

10. Ibid. p. 4.

11. *Mathematics Framework for California Public Schools, Kindergarten Through Grade 12* (Sacramento: California Department of Education, 1999), p. 110.

12. Ibid., pp. 154-56.

13. At the November meeting of the state board, there was discussion about this program, and it was eventually downgraded from a basic to a partial program.

14. For further discussion of what this means, see Harold L. Schoen et al., "Issues and Options in the Math Wars," *Phi Delta Kappan*, February 1999, pp. 444-53.

15. The programs were Investigations in Number, Data, and Space and Connected Mathematics, both published by Dale Seymour and both NSF-funded projects.

16. In this problem, a "notorious pizza pirate" repeatedly steals half the pizza from a school freezer on successive nights, and to solve the problem students must calculate 1/2 x 1/2 x 1/2 x 1/2. Ed Code 60200.5 reads: "Instructional materials adopted under this chapter shall, where appropriate, be designed to impress upon the minds of the pupils the principles of morality, truth, justice, patriotism, and a true

comprehension of the rights, duties, and dignity of American citizenship, and to instruct them in manners and morals and the principles of a free government." For more details on the 1997 adoption, see Bill Jacob, *Instructional Materials for K-8 Mathematics Classrooms: The California Adoption, 1997*, Contemporary Issues in Mathematics Education, edited by Estela Gavosto, Steven Krantz, and William McCallum, Mathematical Sciences Research Institute Publications, no. 36 (Cambridge: Cambridge University Press, 1999), pp. 109-22.

17. The three programs were Connected Mathematics, the Interactive Mathematics Program (IMP), and College Preparatory Mathematics (CPM).

18. Discussion of the problems with CLAS also surfaced in the state board's rejection of the Dale Seymour Investigations in Number, Data, and Space second-grade program, where a sorting activity based on a student-generated list of "scary things" (e.g., spiders and loud noises) was viewed as a potential "invasion of privacy."

19. *Mathematics Framework for California Public Schools*, p. 197.

20. Battista, p. 432.

21. *Mathematics Framework for California Public Schools*, p. 38.

22. Martha Groves and Richard L. Colvin, "High School Exit Exam for State Hits Roadblock: Education Panel Can't Decide About Including Algebra: Citing Time Pressure, Publishers Refuse to Develop the Test," *Los Angeles Times*, 10 December 1999, p. 1.

23. E. D. Hirsch, Jr., "Address to Cal State Board, April 97," mimeographed, California State Board of Education, Sacramento, 1997, p. 3.

24. Ibid., p. 6.

25. David Geary, who was cited by Hirsch, subsequently played a major role in rewriting the framework.

26. Robert Dixon et al., "Report to the California State Board of Education and Addendum to Principal Report -- Review of High-Quality Experimental Research," mimeographed, California Department of Education, Sacramento, March 1998.

27. Battista, p. 431. November 1998, p. 12.

28. O'Brien, p. 435.

29. For details on how a poor research base was authenticated for use in developing the math framework, see Bill Jacob and Joan Akers, "'Research Based' Mathematics Education Policy: The Case of California 1995-1998," preprint, available by request from jacob@math.ucsb.edu, University of California, Santa Barbara, 1999.

30. *Mathematics Model Curriculum Guide, Kindergarten Through Grade 8* (Sacramento: California Department of Education, 1987).

31. Wayne Bishop, "The California Mathematics Standards: They're Not Only Right; They're the Law," *Phi Delta Kappan*, February 1999, p. 440.

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32. See, for example, *To Touch the Future -- Transforming the Way Teachers Are Taught* (Washington, D.C.: American Council on Education, 1999).

33. Jeremy Kilpatrick, "Confronting Reform," *American Mathematical Monthly*, December 1997, pp. 955-62.

34. Richard W. Riley, "The State of Mathematics Education: Building a Strong Foundation for the 21st Century," speech delivered at the annual meeting of the American Mathematical Society and the Mathematical Association of America, Baltimore, January 1998. The text is available in *Notices of the American Mathematical Society*, vol. 45, 1998, pp. 487-90, and from the American Mathematical Society website, http://www.ams.org/notices/199804/riley.pdf.

JERRY P. BECKER is a professor of mathematics education, Department of Curriculum and Instruction, Southern Illinois University, Carbondale. BILL JACOB is a professor of mathematics, Department of Mathematics, University of California, Santa Barbara.

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